Southampton to London Pipeline Project

Scoping Report
Volume 1

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Glossary

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Glossary of Terms

Term	Definition
Additional mitigation	Measures that have been identified through the assessment process to further reduce environmental effects.
Advice Note	The Planning Inspectorate has published a series of Advice Notes that are intended to inform applicants, consultees, the public and others about a range of process matters in relation to the Planning Act 2008 (PA2008).
Aggregate	Granular material (e.g. sand and gravel or crushed rock) that can be used for building and/or civil engineering purposes (e.g. for concrete production).
Agricultural Land Classification	The system devised and introduced by the Ministry of Agriculture, Fisheries and Food to classify agricultural land. It is classified according to its physical or chemical characteristics. Land is graded from 1 (excellent quality) to 5 (very poor quality), with grade 3 subdivided into agricultural subgrades 3a and 3b.
Agri-environment scheme	A mechanism by which landowners and other individuals and bodies responsible for land management can be encouraged to manage their land in a manner sympathetic to the environment.
Air Quality Management Area (AQMA)	Local planning authorities are obliged to declare an AQMA in any area where there are, or are expected to be, exceedances of the relevant Air Quality objectives. The authority declaring an AQMA is obliged to prepare a management plan to prevent or remove any such exceedances.
Air Quality Objective (AQO)	AQO are policy targets for a maximum ambient pollutant concentration to be achieved. The objectives are set out in the UK Government's Air Quality Strategy for the key air pollutants.
Alluvial deposits	Natural materials deposited within and adjacent to rivers.
Ambient sound	A description of the all-encompassing sound at a given location and time. This will include sound from many sources near and far.

Term	Definition
Amenity	A term used to describe the character or attractiveness of an area. The assessment of amenity considers landscape and visual, noise and vibration and traffic and transport effects.
Ancient Woodland	Designated land that has been continually wooded since at least 1600 in England. Regarded as 'irreplaceable habitat' in national planning guidance.
Appropriate Assessment	See 'Habitats Regulations Assessment' below.
Aquifer	An underground layer where the material contains water. This can be less solid material like sand, gravel, clay or silt, or water-bearing rock.
Aquitard	A saturated layer of rock that can restrict groundwater movement.
Arboricultural Method Statement	A statement commonly used to describe how construction works can be carried out close to trees without causing damage to the crown or the root system. It should include details on how the works will be managed and how the trees will be adequately protected during the works.
Area of Outstanding Natural Beauty	Areas in England, Wales and Northern Ireland designated for their significant landscape value and national importance, under Section 82(1) of the Countryside and Rights of Way Act 2000 for the purpose of conserving and enhancing the natural beauty of the designated area.
Assart	A piece of land converted from forest to arable use.
Augerbore	Augerboring is a 'trenchless' method used over relatively short distances and usually at shallow depths. Shallow 'launch' and 'reception' shafts would be dug on either side of the obstacle. An auger (an Archimedes screw or helix on a shaft) would bore horizontally to install a new pipe beneath the obstacle and connect each pit. The pipeline would then be installed within the new (sleeve) pipe, or the product pipe would be pulled by the bore pipe.

Term	Definition
Authorised landfill site	Landfill sites that are currently authorised by the Environment Agency under Environmental Permitting Regulations and which have an environmental permit in place.
Average annual daily traffic (AADT)	The average over a full year of the number of vehicles passing a point in the road network each day.
A-weighting	A measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting). This compensates for the varying sensitivity of the human ear to sound at different frequencies.
Baseline	A reference level of existing environmental conditions against which the Project is measured.
Bed space occupancy	The number/percent of occupied beds within the accommodation sector.
Bedrock geology	Solid rock formations underlying superficial deposits.
Best and most versatile (BMV) land	The most flexible, productive and efficient agricultural land in the UK Agricultural Land Classification system (Grade 1,2 and Subgrade 3a).
Best Practicable Means	A term used under the Control of Pollution Act 1974 and Environmental Protection Act 1990 to refer to measures which are 'reasonably practicable, having regard to local conditions and circumstances, to the current state of technical knowledge and to financial implications', concerning the mitigation of noise and other potential nuisance.
Biodiversity	The variety of life in the world or in a particular habitat or ecosystem.
Birds Directive	Directive on the conservation of wild birds (2009/147/EC). This EU Directive gives effect to the EU's obligations for bird species under the Bern Convention and Bonn Convention and provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. Includes protection of birds in Special Protection Areas.
Boorley Green	The geographical start point of the Project in Hampshire.

Term	Definition
Borehole	A hole bored into the ground, usually as part of investigations, typically to test the depth and quality of soil, rock and groundwater. A borehole can also be used to dewater the ground.
Bowl barrow	Bowl barrows are the most numerous form of round barrow. They are funerary monuments dating from the Late Neolithic period to the Late Bronze Age. Most examples belong to the period 2400-1500 BC. They were constructed as earthen or rubble mounds, sometimes ditched, which covered single or multiple burials. They occur either in isolation or grouped as cemeteries and often acted as a focus for burials in later periods.
Bowser	A mobile vessel used to distribute liquid on construction sites.
British Geological Survey	A partly publicly-funded body that provides technical advice to public and private sectors. It aims to advance geological knowledge of the UK.
Carbon dioxide equivalent	A metric measure used to compare the emissions from various greenhouse gases based on their global warming potential.
Carbon footprint	The total greenhouse gas emissions associated with a particular policy or development.
Cathodic Protection (CP)	Cathodic protection prevents or mitigates corrosion by converting all of the anodic (active) sites on the metal surface to cathodic (passive) sites. It does this by supplying sufficient electrical current from an external source. CP is commonly used to protect steel pipelines and other metallic infrastructure from corrosion.
Chartered Institute of Ecology and Environmental Management (CIEEM)	A professional membership body representing and supporting ecologists and environmental managers in the UK, Ireland and abroad. Previously known as Institute of Ecology and Environmental Management (IEEM).
Collision cluster	A location where there are a number of traffic collisions within a pre-determined distance from a defined point and within a stated number of years.

Term	Definition
Committed Development	A development that has full or outline planning permission, or is allocated in an adopted development plan.
Common Agricultural Policy	The agricultural policy of the European Union. It implements a system of agricultural subsidies and other programmes.
Common land	Land owned collectively by a number of persons, or by one person, but over which other people have certain traditional rights to use the land.
Compensatory storage area	An area designed for the storage of floodwater. This is to compensate for area(s) and volume(s) lost as a result of changes to the floodplain elsewhere.
Conceptual Site Model	Method used to manage identification of the various types of risk relating to contaminated land. The conceptual site model includes: categorisation of sources of contamination; categorisation of potential receptors; and identification of potential contamination pathways (i.e. linking sources to receptors).
Conservation Area	An area designated under Section 69 of the Planning (Listed Buildings and Conservation Areas) Act 1990 as being of special architectural or historic interest and with a character or appearance which is desirable to preserve or enhance.
Construction compound	A compound used during construction for the storage of material, assembly of components or for other construction related activities.
Construction Environmental Management Plan (CEMP)	A plan prepared by a contractor before the start of construction work for a project, detailing 'environmental aspects' that may be affected by the construction work and the measures to be used to prevent or control such effects. A CEMP would be expected to include methods and site management practices to be applied to prevent generation of nuisance dust, potential sources of unintentional damage to the environment, and response and reporting procedures to minimise damage in the event of a pollution incident.

Term	Definition
Construction Traffic Management Plan	Plan detailing the procedures, requirements and standards necessary for managing the traffic effects during construction of the Project so that safe, adequate and convenient facilities for local movements by al transport modes are maintained throughout the construction process.
Contaminated Land: Applications in Real Environments (CL:AIRE)	An independent not-for-profit organisation established in 1999 to stimulate the regeneration of contaminated land in the UK. It aims to raise awareness of, and confidence in, practical and sustainable remediation technologies.
Controlled waters	Waters defined under Section 104 of the Water Resources Act 1991. These include: • relevant territorial waters within three miles of the low tide limit; • coastal waters from the low tide limit to the high tide limit; • the freshwater limit of a river or watercourse; • inland freshwater (e.g. lakes, ponds, reservoirs, rivers, watercourses (including underground)); • surface water sewers, ditches and soakaways discharging to surface or groundwaters; and • groundwater.
Corridor	A corridor is an area where one or more pipeline routes could be designed. It could vary in size, but is typically around 200m wide. Corridors were defined for the SLP corridor options consultation (non-statutory) in spring 2018.
Countryside Stewardship	A land management scheme introduced in 1991, that provided funding to farmers and other land managers to enhance and conserve English landscape, their wildlife and history and help people to enjoy them. This scheme has since been superseded by Environmental Stewardship schemes.
Cropmarks	Cropmarks are the means through which underground archaeological, natural and recent features may be visible from the air. These can reveal buried archaeological sites not visible from the ground.

Term	Definition
Crown Land	“Crown Land” is defined by S227 of the Planning Act 2008 as land in which there is a Crown interest or a Duchy interest.
Culvert	A tunnel (pipe or box-shaped) carrying a stream or open drain under a road or railway.
Cumulative effect	Incremental effects that result from the accumulation of a number of individual effects, either caused by different types of effect from the same project (intra-project effects), or by the interactions between the likely effects of other reasonably foreseeable developments with the likely effects of the proposed project (inter-project effects).
Damming and over pumping methodology	A methodology used when a dry working area is required in a section of a watercourse crossing. This is done by placing temporary barriers on each side of the working area to prevent water ingress while using pumps at the upstream end and temporary pipes to bypass the working area.
Decibel(s)	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140 dB.
Decibel(s) A-weighted	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the ‘A weighting’ and is written as ‘dB(A)’.
Design Life	Design life is the time period for which a pipeline is to be used for its intended purpose with planned integrity management
Designated heritage asset	Heritage assets, including World Heritage Sites, Scheduled Monuments, Listed Buildings, Protected Wreck Sites, Registered Park and Gardens, Registered Battlefields or Conservation Areas, designated under the relevant legislation.
Detrital	Rocks composed of clasts or rock fragments.

Term	Definition
Dewatering	The process of lowering the groundwater level locally to allow excavations to be carried out in workable dry conditions; it also helps to ensure the stability of the excavation side slopes and base.
Development Consent Order (DCO)	A type of planning consent under the Planning Act 2008 for Nationally Significant Infrastructure Projects such as the Project.
Diamicton	Very poorly sorted sediment, often the result of glacial activity. They differ in structure, texture and thickness.
Earthworks (archaeology)	Rises or falls in ground surface which indicate the presence of buried archaeological remains.
Easement	The grant of land rights to allow the construction and operation of the pipeline. The Easement Strip is the area above the pipeline (typically extending 3 meters to either side of the pipeline) in which any development or construction activity is prohibited in order to protect the pipeline
Ecological status	The overall ecological status of surface waters, defined under the EU Water Framework Directive and UK Regulations, is assessed by a number of different quality elements (relating to the movement and water and sediment (hydromorphological), chemical/ physico-chemical and biological) that represent indicators of the overall quality of the water body.
Economically active	People who are either in employment or unemployed but available for employment.
Ecosystem	Biological community of interacting organisms (e.g. plants and animals) and their environment.
Employment rate	The proportion of (16-74 year-old) residents in employment. Employment comprises the proportion of the total resident population who are ‘in employment’ and includes full-time students who are employed.

Term	Definition
Energy crop scheme	Scheme that offers a grant to farmers in England. This is to establish grass and short rotation coppice for their own energy use or to supply power stations.
Environment Agency	Regulatory Agency in England responsible for licences and consents relevant to flooding, discharge consents, waste licences and the protection of the environment.
Environmental Impact Assessment (EIA)	An assessment of the likely effects of a development project on the environment, which is reported in an Environmental Statement that is publicised and consulted on and taken into account in the decision on whether a project should proceed. The requirement for EIA in the UK is derived from EU Directive 2014/52/EU, as implemented through UK regulations. For the Project, the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 contain specific requirements on the content of the ES and other documentation, and for the assessment and decision-making process.
Environmental Management System (EMS)	A set of processes and practices that enable an organisation to reduce its environmental impacts and increase its operating efficiency.
Environmental permit	A permit required under the Environmental Permitting (England and Wales) Regulations 2016 for carrying out regulated activities.
Environmental Statement (ES)	The main output from the EIA process, an ES is the report required to accompany an application for development consent (under the Infrastructure Planning (EIA) Regulations) to inform public and stakeholder consultation and the decision on whether a project should be allowed to proceed. The EIA Regulations set out specific requirements for the contents of an ES for Nationally Significant Infrastructure Projects.

Term	Definition
Environmental Stewardship	A land management scheme that provides funding to farmers and other land managers in England to deliver effective environmental management.
Equivalent Continuous Sound Pressure Level or LpAeq,T	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value.
Esso	Esso Petroleum Company, Limited (“Esso”), the Project promoter and future applicant for DCO.
European Protected Species	Animals and plants listed under the Habitats Directive and protected under the Conservation of Habitats and Species Regulations 2017.
European Protected Species Licence	The license issued to permit an activity affecting European Protected Species that would otherwise be an offence under the Habitats Regulations.
European site	A site protected by the Conservation of Habitats and Species Regulations 2017 for its international importance, including Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSACs), possible SACs, Special Protection Areas (SPAs), potential SPAs (pSPAs), Ramsar sites and proposed Ramsar sites.
Exhibitions	The term used to refer to public events being held during the statutory and non-statutory consultation periods.
Flood Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding.
Flood Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.

Term	Definition
Flood Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Flood Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.
Floodplain	Land adjacent to a watercourse over which water flows or would flow in times of flood, but for defences in place.
Flume pipe	A pipe used when a dry working area is required in a section of a watercourse. This is done by placing temporary barriers on each side of the working area to prevent water ingress while using a flume pipe (adequately sized based on expected flows in the watercourse) to connect the two barriers and keep the water flowing during the works.
Fluvial flooding	Flooding associated with rivers and streams breaking their banks.
Full-time equivalent (FTE)	FTE employment is calculated by converting all employees' hours into full-time employees' equivalent – i.e. an employee who works half the hours of a full time employee is equivalent to 0.5 FTE.
Gazetteer	A list of heritage assets, detailing their locations (with map references), heritage grade listings and a brief description of each.
Green Belt	A designation for land around certain cities and large built-up areas, which aims to keep this land permanently open or largely undeveloped.
Greenhouse gases	Atmospheric gases such as carbon dioxide, methane, chlorofluorocarbons, nitrous oxide, ozone, and water vapour that absorb and emit infrared radiation emitted by the Earth's surface, the atmosphere and clouds.
Gross Domestic Product	Measure of the total economic activity in a country.

Term	Definition
Gross Value Added	Measure of the contribution to the economy of each individual producer, industry or sector in a country.
Ground-borne sound	Sound generated inside a building by ground-borne vibration.
Ground-borne vibration	Vibration generated by an event such as the pass-by of train in a tunnel, propagated through the ground or structure (i.e. not the air) into a receiving building.
Groundwater	All water which is below the surface of the ground and within the permanently saturated zone.
Groundwater Body	A distinct volume of groundwater within an aquifer.
Groundwater Source Protection Zone	See 'Source Protection Zone' below.
Groundwater status	The status of a body of groundwater, determined by the poorer of its quantitative status and its chemical status.
Habitat Suitability Index (HIS)	A technique used for evaluating the suitability of habitats for specific species of wildlife in order to assess the likelihood of their presence or absence.
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna.
Habitats Regulations	The Conservation of Habitats and Species Regulations 2017, which provide for the designation and protection of 'European Sites', the protection of 'European Protected Species', and the adaptation of planning and other controls for the protection of European Sites.
Habitats Regulations Assessment	The process by which plans and projects are assessed for whether they are likely to have a significant effect on a European Site either alone or in combination with other plans or projects, under the Habitats Directive and the Conservation of Habitats and Species Regulations 2010.

Term	Definition
Hazardous waste	Waste which contains substances or has properties that might make it harmful to human health or the environment. Hazardous waste is currently defined in the Hazardous Waste List incorporated in the European Waste Catalogue (2001) and is regulated in England under the Hazardous Waste (England and Wales) Regulations 2005.
Heritage asset	A building, monument, site, place, area or landscape, identified for its heritage interest. Heritage asset includes designated heritage assets and assets identified by the local planning authority (including local listing).
Historic England	The public body that looks after England's historic environment. An executive non-departmental public body of the British Government sponsored by the Department for Culture, Media and Sport, and the Government's advisor on heritage.
Historic environment	All aspects of the environment resulting from the interaction between people and places through time. This includes all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed vegetation.
Historic Environment Record	A record of all known archaeological finds and features and historic buildings and historic /landscape features, relating to all periods from the earliest human activity to the present day; maintained by each County and Unitary Authority in the UK.
Historic landfill	Sites where records of waste being received to be buried are now closed, meaning there is no Pollution Prevention and Control (PPC) permit or waste management licence currently in force. This also applies to landfills which had no permit to operate in the first instance, e.g. those which operated before the Control of Pollution Act 1974.
Historic landscape characterisation	The identification and interpretation of the history of the present day landscape or townscape within a given area.

Term	Definition
Horizontal Directional Drilling	Trenchless method for the installation of pipes, conduits and cables in a shallow arc using a surface launched drilling rig. In particular, it applies to large scale crossings in which a fluid filled pilot bore is drilled without rotating the drill string, and this is then enlarged by a washover pipe and back reamer to the size required for the product pipe. The required deviation during pilot boring is provided by the positioning of a bent sub.
Hydrostatic testing	A hydrostatic test is a way in which pressurised elements of a hydraulic system such as pipelines and vessels can be tested for strength, performance and leaks. The test pressurises the pipe or vessel using an incompressible liquid up to the required test pressure that meets the relevant standards and client's requirements.
Inert waste	Waste that is not chemically reactive and does not undergo any significant physical, chemical or biological transformations. The current definition of inert waste is described in Regulation 7(4) of the Landfill Regulations 2002. Inert wastes are effectively non-hazardous wastes (in accordance with the European Waste Catalogue 2001) which meet the requirements of Inert Waste Acceptance Criteria (WAC) limits and therefore can be landfilled at an inert waste landfill.
Infrastructure	Infrastructure is the fundamental facilities and systems serving a country, city, or other area, including the services and facilities necessary for its economy to function.
In-line valves	Valves that are installed in a product pipeline so they control the aperture and flow in the pipe bore.
Inorganic (contaminant)	Contaminants comprised primarily of metals, metal compounds, certain minerals, acids and alkalis.
In-situ preservation	Preserving archaeological remains in their original position.
Inter-project effects	The cumulative interaction of the project with other committed development projects.
Intra-project effects	When a single resource or a receptor is affected by multiple effects from the same

Term	Definition
	development project, and the effects act together, it is called intra-project effects.
Invasive Non-Native Species	Non-native plants that are invasive, for example Japanese knotweed.
Joint Nature Conservation Committee	The public body that advises the UK Government and Welsh Government on UK-wide and international nature conservation.
LA90	Noise level is exceeded for 90% of the period of interest.
Land use	The primary use of the land, including both rural and urban activities.
Landform	Combinations of slope and height that produce the shape and form of the land.
Landscape character types	The distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape.
Landscape Character Area	Areas of landscape that have a broadly consistent pattern of topography, land use and vegetation cover.
Landscape condition	The physical state of the landscape, and how intact it is, from a visual, functional, and ecological viewpoint. It also reflects the state of repair of individual features and elements which make up the character in any one place.
Landscape effect	Change in the elements, characteristics, character and qualities of the landscape as a result of development. These effects can be positive or negative.
Landscape feature	A prominent eye-catching element, for example, wooded hilltop or church spire.
Landscape sensitivity	The extent to which a landscape can accept change of a particular type and scale without unacceptable adverse effects on its character.
Laydown Area	An area used for the temporary storage of construction equipment and supplies.
Light Goods Vehicle	A motor vehicle used to carry goods with a total mass of up to 3.5 tonnes.

Term	Definition
Limits of deviation	The widest area, within the Order Limits, within which the pipeline could be installed.
'Linesearch before U dig' data	Online service which has a database of existing underground utility assets in the UK.
Listed Building	A measure of a building's special architectural and historic interest. It brings it into the planning system, so that it can be protected for future generations. Listing includes the interior, exterior and the setting of the building. There are three categories of listed buildings: - Grade I buildings are of exceptional interest, (only 2.5% of listed buildings are Grade I); - Grade II* buildings are particularly important buildings of more than special interest (5.8% of listed buildings); - Grade II buildings are of special interest (91.7% of all listed buildings).
Local Biodiversity Action Plan	A plan aimed at conserving the fauna, flora and habitats - collectively referred to as biodiversity - of a defined area, usually along local authority boundary lines.
Local Nature Reserves	Sites dedicated by the local authority under Section 21 of the National Parks and Access to the Countryside Act 1949 for nature conservation which have wildlife or geological features that are of special interest locally.
Local Plan	A local plan sets out local planning policies and identifies how land is used, determining what will be built where. Adopted local plans provide the framework for local development across England.
Local Planning Authority	The local authority (District Council or Unitary authority) responsible for local planning.
Local Wildlife Site	Non-statutory sites of nature conservation value that have been designated 'locally'. These sites are referred to differently between counties with common terms including Site of Importance for Nature Conservation (SINC), Site of Nature Conservation Interest (SNCI), County Wildlife Site, Site of Borough Importance, Site of Local Importance and Sites of Metropolitan Importance.

Term	Definition
Macrophyte	Aquatic plants that grow in or near water.
Made ground	Land where natural and undisturbed soils have largely been replaced by man-made or artificial materials. It may be composed of a variety of materials including imported natural soils and rocks with or without residues of industrial processes (such as ash) or demolition material (such as crushed brick or concrete).
Main Header Drains	This is an element of an in-field land drainage system. It is the pipe connecting a set of laterals drains running across the field to an outfall.
Main River	A watercourse designated by the Environment Agency as a main river and marked as such on their main river map. The Environment Agency's powers to carry out maintenance works apply to main rivers only. A watercourse should be classified as a main river if it has a significant flood consequence to people and property, or could lead to significant flooding across the river catchment.
Major Development	“Major Development” means development involving any one or more of the following— (a) the winning and working of minerals or the use of land for mineral-working deposits; (b) waste development; (c) the provision of dwelling houses where— (i) the number of dwelling houses to be provided is 10 or more; or (ii) the development is to be carried out on a site having an area of 0.5 hectares or more and it is not known whether the development falls within sub-paragraph (c)(i); (d) the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or (e) development carried out on a site having an area of 1 hectare or more;
Mass haul movement	The movement of excavated material from where it arises to where it is to be used, treated or disposed of. This may be

Term	Definition
	undertaken via railway, road or within the area required for constructing the project.
Maximum Sound Level	The maximum level of sound identified during a given time interval, T.
Micron	An alternative term for micrometre (µm).
Micro-Tunnelling	Trenchless method of steerable remote control pipe jacking to install pipes of internal diameter less than that permissible for man-entry. The pipe jacking is done by hydraulic or other jacking methods from a drive shaft such that the pipes form a continuous string in the ground.
Minerals Consultation Area	An area identified in order to ensure consultation between the relevant minerals planning authority, the minerals industry and others before certain non-mineral planning applications made within the area are determined.
Mineral and Waste Consultation Areas	Mineral and Waste Consultation Area (MWCA): An area identified to ensure consultation between the relevant Local Planning Authority, the minerals and waste industry and the relevant Minerals and Waste Planning Authority before certain non-mineral planning applications made within the area are determined which may impact safeguarded mineral resources or safeguarded minerals and waste infrastructure. In Hampshire the MWCA incorporates the Minerals Consultation Area (which incorporates the Mineral Safeguarding Area) as well as safeguarded minerals and waste sites.
Mineral Safeguarding Area	An area designated by Minerals Planning Authorities which covers known deposits of minerals which are desired to be kept safeguarded from unnecessary sterilisation by non-mineral development.
Mineral and Waste Local Plan Safeguarded Sites	The areas designated by the minerals and waste authorities for mineral production and waste treatment.
Minerals Preferred Search Areas	A geographic area within which a mineral resource could be developed.

Term	Definition
Monitoring	A program of repetitive observation, measurement and recording of environmental variables and operational parameters over a period of time for a defined purpose. Monitoring is important to EIA, both to assess adherence to standards and commitments, and the accuracy of predictions and assumptions in the ES, and to check and to support management options.
Multiplier (economic/employment)	An effect in economics in which an increase in direct spending produces an increase in national income and consumption that is greater than the initial amount spent. For example, building a factory will lead to the employment of construction and factory workers. This new employment will stimulate growth and employment in local services in the surrounding areas (e.g. cafes, restaurants, shops etc.), as new demand will be generated.
National Cycle Network	A series of traffic-free paths and quiet, on-road cycling and walking routes that connect to every major town and city. These routes are promoted for both recreational and active travel purposes.
National heritage list	The National Heritage List for England is an online searchable database of designated heritage assets (excluding Conservation Areas).
National Nature Reserve	Sites that are dedicated by the statutory country conservation agencies, under the National Parks and Access to the Countryside Act 1949 and the Wildlife and Countryside Act 1981, for nature conservation and which have wildlife or geological features that are of special interest nationally. These are in public ownership.
National Trails	Long distance footpaths and bridleways in England and Wales.
National Trust Open Access Land	Land owned by the National Trust that can be accessed by the public free of charge.

Term	Definition
Nationally Significant Infrastructure Project	Under The Planning Act 2008, nationally significant infrastructure projects (NSIPs) are large scale projects falling into five general categories (Energy; Transport; Water; Waste Water and Waste). They include projects as diverse as electricity generating projects, rail freight interchanges, reservoirs and hazardous waste facilities.
Natura 2000 Sites	Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and candidate SACs designated under the Birds Directive 2009/147/EC and Habitats Directive 92/43/EEC. Also referred to as 'European sites', along with Ramsar sites, potential SPAs and possible SACs.
Natural England	Executive non-departmental public body constituted under the Natural Environment and Rural Communities Act 2006 (section 2(1)) to ensure that the natural environment is conserved, enhanced and managed for the benefit of present and future generations, thereby contributing to sustainable development.
Natural Environment and Rural Communities Act 2006	An act responsible for the creation of Natural England. The aim of which is to achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering government policy. Section 40 of the NERC Act places a duty to conserve biodiversity on public authorities in England. Section 41 requires the Secretary of State to publish and maintain lists of species and types of habitats which are regarded by Natural England to be of "principal importance" for the purposes of conserving biodiversity in England.
Nitrate Vulnerable Zone	Areas covering 62% of England designated as a result of the European Union's Nitrates Directive in order to reduce the level of nitrates in surface and groundwater. Farmers with land in nitrate vulnerable zones have to follow mandatory rules to tackle nitrate loss from agriculture.

Term	Definition
Nitrogen Dioxide	A gas produced when fuels are burned and is often present in motor vehicle and boiler exhaust fumes.
Nitrogen Oxide	A group of chemical compounds consisting only of nitrogen and oxygen which may be interconverted in the atmosphere. The principal oxides of nitrogen are nitric oxide and nitrogen dioxide.
Non-hazardous Waste	Any waste not defined as 'hazardous' under Directive 91/689/EEC.
Non-motorised users	Includes pedestrians, cyclists and equestrians.
Non-technical Summary	A report which, in the case of an ES, briefly describes the main points discussed in the ES without the use of technical language.
Office for National Statistics	The UK's largest independent producer of official statistics and the recognised national statistical institute of the UK.
Open access land	Areas of land over which the public have a right of access pursuant to the Countryside and Rights of Way Act 2000.
Open-cut trenching excavation	The open cut trench method involves excavating down to the pipeline bedding level using battered or vertical sides to install, repair or replace a pipeline. Once the pipeline is installed the trench is backfilled and the topsoil or existing features at surface level are reinstated.
Order Limits	All land that will be permanently acquired or temporarily possessed, in order to carry out the Project, including both the pipeline route and the temporary working areas that will be required to install the pipeline, such as access routes and working compounds. Provisional limits have been defined for the purpose of this report.
Ordinary watercourse	Ordinary watercourse means a watercourse that does not form part of a main river. The Lead Local Flood Authority in whose area the watercourse lies has powers to consent works to ordinary watercourses and permissive powers to undertake works where necessary.

Term	Definition
Ordnance Datum	Above Ordnance Datum (AOD) refers to the height above mean sea-level, taken from a reference point at Newlyn, Cornwall. This is the national height system for Britain.
Organic (contaminant)	Contaminants composed primarily of oils, tars or solvents.
Particulate Matter	Discrete particles in ambient air, with diameters ranging between nanometers (billionths of a metre) to micrometres (millionths of a metre).
Passenger car unit (PCU)	A standard measure of vehicles to assess the traffic flow rate on the road network.
Permeability / hydraulic conductivity	Measure of a rock's ability to transmit water.
Photomontage	Inserting an image of the project onto a photograph for the purpose of creating an illustrative representation of potential changes to existing views.
Pigging stations	Pigging stations allow the entry and exit points for Pipeline Inspection Gauges (PIGs) from time to time.
Pipeline control centre	This is staffed 24 hours a day and seven days a week, and uses sophisticated tools to monitor all aspects of the pipeline.
Pipeline corridor	A pipeline corridor is an area where one or more routes could be designed. It could vary in size but is typically around 200m wide.
Pipeline Inspection Gauges	PIG stands for Pipeline Inspection Gauges and they are used but not limited to clean and inspect pipelines without the need to stop the flow of the product. The pressure of the product in the pipeline is used to push the PIG down the pipe. These are part of the maintenance system that ensures the line is safe.
PIG receiver	The PIG receiver is a section of the pipeline that acts as the receiving trap to recover the PIG.
Pipeline markers	These are a legal requirement and are found at key points such as road crossings. The marker posts indicate the presence of a pipeline below the ground.

Term	Definition
Pipeline networks	The network of pipelines supporting each other to secure supplies of fuel and other petroleum products for millions of British consumers.
Planning Inspectorate	The Planning Inspectorate deals with planning appeals, national infrastructure planning applications, examinations of local plans and other planning-related and specialist casework in England and Wales. It is an executive agency, sponsored by the Ministry of Housing, Communities & Local Government and the Welsh Government.
PM_{10}	PM_{10} is any particulate matter with an aerodynamic diameter equal to or less than 10 micrometres.
$PM_{2.5}$	$PM_{2.5}$ is any particulate matter with an aerodynamic diameter equal to or less than 2.5 micrometres.
Priority Habitat	UK Biodiversity Action Plan (BAP) priority habitats are those identified as being the most threatened and requiring conservation action under the UK BAP.
Preferred corridor	The single corridor chosen for the replacement pipeline, which was announced in May 2018, after the non-statutory consultation on corridor options in March / April 2018.
Preferred route	Once a single route is chosen, this route will be known as the preferred route.
Preliminary Environmental Information Report (PEIR)	A report compiled by the applicant as part of the EIA process, which enables consultees and the public (stakeholders) to understand the likely environmental effects of the proposed development, and helps to inform their responses to the statutory consultation on the proposed development during the pre-application stage.
Principal Aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability, meaning they usually provide a high level of water storage and transmission. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifers.

Term	Definition
Protection of Badgers Act 1992	A piece of UK legislation that provides protection to badgers and lists offences against them.
Public Right of Way	A highway where the public has the right to walk. It can be a footpath (used for walking), a bridleway (used for walking, riding a horse and cycling), or a byway that is open to all traffic (include motor vehicles).
Ramsar site	Wetland sites that are of international importance, as designated under Article 2(1) of the Convention on Wetlands of International Importance especially as Waterfowl Habitat, held in Ramsar, Iran, in 1971.
Receptor	A component of the natural or built environment (such as a human being, water, air, a building or a plant) affected by an impact of the construction and/or operation of a proposed development.
Receptor-based approach	This approach focuses on identifying the effects of various aspects of the proposed project on sensitive receptors.
Register of Historic Battlefields	English Heritage's non-statutory register which identifies important English battlefields. Its purpose is to offer them protection and to encourage a greater understanding of their significance.
Register of Historic Parks and Gardens	The Historic Buildings and Ancient Monuments Act 1953 authorises Historic England to compile a register of "gardens and other land" situated in England that appear to be of special historic interest. This register identifies over 1,600 sites of historic interest in England assessed to be of national importance. Its purpose is to offer them protection and to encourage a greater understanding of their significance.
Registered Park and Garden	A park or garden included on Historic England's Register of Historic Parks and Gardens. Sites are graded I, II* or II along the same lines as listed buildings. 62% are graded as II, 27% are considered of more than special interest and graded II*, 9% are of exceptional interest and are classified as Grade I.

Term	Definition
Reservoir flooding	Flooding arising from a failure of containment of a reservoir. Risks are very low due to strict monitoring of reservoirs.
Residual impacts	Residual impacts are defined as those impacts that remain following the implementation of the mitigation measures proposed.
River Basin Management Plan	Plans developed under the EU Water Framework Directive setting out environmental objectives for all groundwater and surface water bodies and protected areas within a river basin district.
Rochdale Envelope	The Rochdale Envelope approach was developed during onshore planning applications to provide flexibility in design options where details of the whole project are not available when the application is submitted, while ensuring the impacts of the final development are fully assessed during the Environmental Impact Assessment (EIA). Consents granted on the basis of the Rochdale Envelope are conditional on providing the final details for agreement prior to construction.
Room occupancy	The number/percent of occupied rooms within the accommodation sector.
Route	A single path of the replacement pipeline. A route is typically in the region of 20 – 30 metres wide for the installation period. A provisional route of the pipeline together with its construction working width has been used to develop the Scoping Report, hereinafter referred to as the “Route”.
Runoff	The flow of water over the ground surface.
Scheduled Monument	An historic building or site whose heritage interest is nationally important, that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. Covered by the Ancient Monuments and Archaeological Areas Act 1979.

Term	Definition
Scoping	An initial stage in the environmental impact assessment process to determine the nature and potential scale of environmental effects arising as a result of a proposed development, and an assessment of what further studies are required to establish the significant environmental effects.
Scoping Opinion	A Scoping Opinion is the authority's formal view on the issues an Environmental Statement should contain. For the Project the Scoping Opinion is given by the Planning Inspectorate on behalf of the Secretary of State for Business, Energy and Industrial Strategy.
Secondary Aquifer	There are two types of secondary aquifer designation. Secondary A: permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers; and Secondary B: predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
Setting (cultural heritage)	The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive, negative or neutral contribution to the significance of an asset and may affect the ability to appreciate it.
Severance	Used to refer to a change in ease of access for non-motorised users due to, for example, a change in travel distance or travel time or a change in traffic levels on a route that makes it harder for non-motorised users to cross. A reference to severance does not necessarily imply a route is closed to access.
Silt boom (or Curtain)	Silt curtains are floating barriers used to contain and control the dispersion of suspended solids in a water body, usually

Term	Definition
	during construction works within the water body or adjacent to it.
Site of Special Scientific Interest	A statutory designation under the Wildlife and Countryside Act 1981 (as amended), protecting nationally important wildlife sites, habitats and geological sites.
Soil profile	A vertical cross-section through a soil.
Soil resource	The textures, structures and volume of different qualities of topsoil and subsoil that have a potential for beneficial reuse.
Soil sealing	Covering the soil surface with an impermeable material.
Soil structure	The combination or aggregation of soil particles into larger compound units (or peds) with pore spaces and channels between that allow the flow of air and water and the penetration of roots. The secondary units are characterised and classified on the basis of size, shape and degree of development.
Soil texture	The relative proportion of the various soil particle size fractions in a soil (sand, silt and clay).
Sound power level	Sound power levels are a measure of the sound energy given out by equipment. This is a property of the equipment and is independent of factors such as distance.
Source Protection Zones (SPZ)	Zones defined by the Environment Agency around groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. There are three main zones: inner (SPZ1), outer (SPZ2) and total catchment (SPZ3).
Special Area of Conservation	Protected sites designated under the Habitats Directive, representing internationally important, high-quality conservation sites that significantly contribute to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended).
Special Protection Area	Site of European importance for bird conservation, designated under the Birds Directive.

Term	Definition
Stakeholder	Organisations and individuals who could affect or are affected by the Project, or who otherwise have an interest in the Project.
Stakeholder engagement	An inclusive process of consultation and engagement with stakeholders to obtain information, views and opinions.
Statutory consultee	Organisations, bodies and persons, defined by statute, which must be consulted on the application for development consent.
Subsoil	Weathered soil layer extending between the natural topsoil and the unweathered basal layer (geological parent material) below, or similar material on which topsoil can be spread. Subsoil has lower organic matter and plant nutrient content than topsoil. In most cases topsoils require a subsoil to perform one or a number of natural soil functions.
Superficial deposit	A geological deposit that was laid down during the Quaternary period. Such deposits were largely formed by river and glacial processes but can also include wind-blown deposits known as loess.
Supply chain	A system of organisations, people, activities, information, and resources involved in moving a product or service from supplier to customer.
Surface water	Waters including rivers, lakes, loughs, reservoirs, canals, streams, ditches, coastal waters and estuaries.
Surface water (pluvial) flooding	Flooding caused by the overflowing of drainage systems and/or the passage of flows overland to rivers and streams.
Surplus excavated material	Excavated material becomes surplus if: its irrecoverable physical, chemical or biochemical quality prevents it from being used in the project; there is more material than required for the project; or the requirement for a type of material is too far away from the excavation point to make its use practicable.
Topsoil	Upper layer of a soil profile, usually darker in colour (because of its higher organic matter content) and more fertile than subsoil, and which is a product of natural biological and environmental processes.

Term	Definition
Tranquillity	A state of calm and quiet associated with peace, considered to be a significant asset of landscape.
Trenchless crossing	Trenchless technology is a type of subsurface construction work for placing new pipe, cable or conduit in the ground between two defined points without continuous, open cut excavation between them, or for renovating, replacing, and rehabilitating existing underground services.
Trial Holes	A trial hole or pit (or test pit) is an open cut excavation of ground in order to study or sample the composition and structure of the subsurface, usually dug during a site investigation, a soil survey or a geological survey. It is also used to identify and locate existing underground services.
Unexploded Ordnance	Explosive weapons that did not explode when they were deployed and still pose a risk of detonation.
Unstable ground	Ground that may be subject to movement caused by a number of natural geological hazards (such as underground cavities) or manmade features (such as artificial ground) that could present particular engineering risks.
Valves	A valve is a device that regulates, directs or controls the flow of a fluid by opening, closing, or partially obstructing various passageways..
Visual amenity	The overall pleasantness of the views people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area.
Visual effect	Change in the appearance of the landscape as a result of development. This can be positive (i.e. beneficial or an improvement) or negative (i.e. adverse or a detraction).
Visual receptors	People who experience the visual amenity offered by the landscape.
Waste permit	A permit required under the Environmental Permitting (England and Wales) Regulations

Term	Definition
	2016 for using, treating, storing and disposing of waste.
Water Framework Directive	The EU Water Framework Directive establishes a framework for the protection of inland surface waters, estuaries, coastal waters and groundwater. The framework for delivering the Directive is through River Basin Management Planning. The UK has been split into several River Basin Districts (RBDs). Each River Basin District has been characterised into smaller management units known as Water Bodies. The surface Water Bodies may be rivers, lakes, estuary or coastal.
Water stops (or “stanks”)	Impermeable material placed in the pipe trench to prevent groundwater migrating rapidly through the granular material of the pipe bedding / surround to avoid washing out of the trench backfill materials and/or localised flooding at low points of the pipe alignment.
Wildlife and Countryside Act 1981	The principal piece of UK legislation relating to the protection of wildlife.
Woodland Grant Scheme	A woodland management scheme that provides funding to farmers and other land managers in England to improve woodland planting and management.
Working width	The width required to install or build a pipeline. It includes space for a haul road, excavator working area, pipe stringing area, trench excavation and spoil pile / topsoil storage area.
Work front	A specific area or location where a crew are carrying out a particular aspect of the main pipeline construction activities, including topsoil stripping, trench excavation, pipe installation laying and backfilling of trenches and re-laying of sub-soil. There may be a number of work fronts operating simultaneously.
Work Section	The Project is split into eight work Sections (A-H). These are to aid the reader in locating areas within the project.

Term	Definition
Zero Carbon	An activity or infrastructure which causes or results in no net release of carbon dioxide into the atmosphere.
Zero Waste	Zero Waste means designing and managing products and processes to reduce the volume and toxicity of waste and materials, conserve and recover all resources, and no trash to be sent to landfills or incinerators.
Zone of influence	The area within which a project activity may be experienced.
Zone of Theoretical Visibility	Areas of land within which a development is theoretically visible.

Acronyms

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Abbreviation	Definition
AADF	Annual Average Daily Flow
AADT	Annual Average Daily Traffic
AEP	Annual Exceedance Probability
AGI	Above Ground Installation
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
BAP	Biodiversity Action Plan
BB93	Building Bulletin 93
BGS	British Geological Survey
BMV	Best and Most Versatile
BOA	Biodiversity Opportunity Areas
BSI	British Standards Institution
CAP	Common Agricultural Policy
C&D	Construction and Demolition
CD&E	Construction, Demolition and Excavation
CDOIF	Chemicals & Downstream Oil Industries Forum
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIWM	Chartered Institute of Waste Management
CL:AIRE	Contaminated Land: Applications in Real Environments
CLR	Contaminated Land Report
CoCP	Code of Construction Practice
COMAH	Control of Major Accident Hazards
CoPA	Control of Pollution Act
CP	Cathodic Protection
CRTN	Calculation of Road Traffic Noise
CRoW	The Countryside and Rights of Way Act 2000
CSM	Conceptual Site Model

Abbreviation	Definition
CTMP	Construction Traffic Management Plan
dB	Decibel
dB(A)	A-weighted decibel
DCLG	Department of Communities and Local Government
DCO	Development Consent Order
DECC	(the former) Department of Energy and Climate Change
DEFRA	Department for Environment, Food and Rural Affairs
DMPO	Development Management Procedure (England) Order
DMRB	Design Manual for Roads and Bridges
DoE	(the former) Department of the Environment
DPD	Development Plan Document
DsPH	Directors of Public Health
EA	Environment Agency
EAI	Extended Area of Influence
EC	(the former) European Community
ECoW	Environmental Clerk of Works
eDNA	Environmental DNA
EDR	Environmental Damage (Prevention and Remediation) Regulations
EFRD	Emergency Flow Restriction Device
EI	Energy Institute
EIA	Environmental Impact Assessment
EMS	Environmental Management System
EPA	Environmental Protection Act 1990
EPS	European Protected Species
EPSML	European Protected Species Mitigation Licence
EPUK	Environmental Protection UK
EQS	Environmental Quality Standard
ES	Environmental Statement
EU	European Union
GCN	Great Crested Newt
GI	Ground Investigation

Abbreviation	Definition
GiGL	Greenspace Information for Greater London
GIS	Geographical Information System
GLHER	Greater London Historic Environment
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, 3rd edition
GPCL2	Guiding Principles for Managing and Reducing Land Contamination
GVA	Gross value added
GWDTE	Groundwater Dependent Terrestrial Ecosystems
GWSA	Groundwater Study Area
HBIC	Hampshire Biodiversity Information Centre
HDV	Heavy duty Vehicle
HE	Historic England
HER	Historic Environmental Records
HGBI	Herpetofauna Groups of Britain and Ireland
HGV	Heavy Goods Vehicle
HHER	Hampshire Historic Environment Record
HRA	Habitats Regulations Assessment
HSE	Health & Safety Executive (UK Regulator)
HSL	Health & Safety Laboratory
IAQM	Institute of Air Quality Management
IEMA	Institute of Environmental Management and Assessment
INNS	Invasive Non Native Species
IPC	(the former) Infrastructure Planning Commission (now part of the Planning Inspectorate)
ISO	International Organization for Standardization
JNCC	Joint Nature Conservation Committee
JSNA	Joint Strategic Needs Assessment
LAI	Local Area of Influence
LBAP	Local Biodiversity Action Plan
LDV	Light Duty Vehicles
LDWR	Long distance walking route

Abbreviation	Definition
LFD	Landfill Directive
LGV	Light Goods Vehicle
LiDAR	Light Detection and Ranging
LNR	Local Nature Reserves
LOAEL	Lowest Observed Adverse Effect Level
LONI	Letter of No Impediment
LPA	Local Planning Authority
LSE	Likely Significant Effects
LSOA	Lower Layer Super Output Area
LTP	Local Transport Plan
LVIA	Landscape and Visual Impact Assessment
LWA	A weighted Sound Power Level
MAE	Major Accident Event
MAFF	(the former) Ministry of Agriculture, Fisheries and Food (now DEFRA)
MAGIC	Multi-Agency Geographic Information for the Countryside
MAH	Major Accident Hazard
mAOD	meters Above Ordnance Datum
MATTE	Major Accident To The Environment
MoD	Ministry of Defence
MSDS	Material Safety Data Sheet
N/A	Not Applicable
NCN	National Cycle Network
NDT	Non-destructive testing
NE	Natural England
NERC	Natural Environment Research Council
NIA	Nature Improvement Area
NMU	Non-Motorised User
NNR	National Nature Reserves
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPS	National Policy Statement

Abbreviation	Definition
NPSE	Noise Policy Statement for England
NRMM	Non-road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
ONS	Office for National Statistics
OS	Ordnance Survey
PCU	Passenger Car Unit
PIC	Personal Injury Collisions
PEIR	Preliminary Environmental Information Report
PIG	Pipeline Inspection Gauge
PINS	Planning Inspectorate
$PM_{2.5}$	Particulate matter 2.5 micrometres or less in diameter
PM_{10}	Particulate matter 10 micrometres or less in diameter
PP&CP	Pollution Prevention and Control Plan
PPG	Planning Practice Guidance
PRoW	Public Right of Way
PTES	People's Trust for Endangered Species
Q95	Flow exceeded 95% of the time
QRA	Qualitative Risk Assessment
REAC	Register of Environmental Actions and Commitments
RoFSW	Risk of Flooding from Surface Water
RVEI	Road Verge of Ecological Importance
SAC	Special Area of Conservation
SANGS	Suitable Alternative Natural Greenspace
SARG	Surrey Amphibian and Reptile Group
SBI	Site of Borough Importance
SBIC	Surrey Biodiversity Information Centre
SDNP	South Downs National Park
SDNPA	South Downs National Park Authority
SHDC	Surrey Heath District Council
SHER	Surrey County Council Historic Environment Record
SINC	Sites of Importance for Nature Conservation

Abbreviation	Definition
SLP Project	Southampton to London Pipeline project
SMC	Scheduled Monument Consent
SMI	Site of Metropolitan Importance
SNCI	Sites of Nature Conservation Importance
SNP	Surrey Nature Partnership
SNRHW	Stable Non-Reactive Hazardous Wastes
SOAEL	Significant Observed Adverse Effect Level
SPA	Special Protection Area
SPZ	Source Protection Zone
SQEP	Suitably Qualified and Experienced Practitioner
SRAM	Safety Report Assessment Manuals
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage System
SWDE	Surface Water Dependent Ecology
SWMP	Site Waste Management Plan
SWT	Surrey Wildlife Trust
TBM	Tunnel Boring Machine
TPO	Tree Preservation Order
UKSO	United Kingdom Soil Observatory
UXO	Unexploded ordnance
VOC	Volatile Organic Compounds
WCCHER	Winchester City Council Historic Environment Record
WFD	Water Framework Directive
WHO	World Health Organisation
ZOI	Zone of Influence
ZTV	Zone of Theoretical Visibility

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Chapter 1
Introduction

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1. Introduction

1.1 Project Overview

1.1.1 Esso Petroleum Company, Limited (Esso) is looking to replace 90km (56 miles) of its existing 105km (65 miles) aviation fuel pipeline that runs from the Fawley Refinery near Southampton, to the West London Terminal storage facility in Hounslow. Within the Scoping Report, this replacement is referred to as the Project.

1.1.2 Completed in 1972, the existing pipeline originally used to transport a type of oil used by large industrial facilities and oil-fired power stations. Since the 1980s it has been used to supply aviation fuel to some of the UK's busiest airports. Esso is now looking to update this key piece of infrastructure to maintain the supply of aviation fuel.

1.1.3 Esso has already replaced 10km of pipeline between Hamble and Boorley Green in Hampshire and now wants to replace the 90km of pipeline between Boorley Green and the West London Terminal storage facility in Hounslow.

1.1.4 Since the existing pipeline was built, Hampshire and Surrey have changed significantly. The South Downs National Park and many other protected sites have been established along the existing pipeline.

1.1.5 A number of corridor options for the replacement pipeline route were identified, and a team of engineering, environmental, and planning experts assessed these against the Project Objectives and Guiding Principles in multi-disciplinary workshops. The number of corridor options has now been reduced to a single preferred corridor, within which a route for the replacement pipeline has been identified (Figure 1.1, see Volume 2). The route referred to within the Scoping Report is a proposed alignment of the replacement pipeline to continue from the previously replaced section and run from Boorley Green to the West London Terminal storage facility. The areas of land to be permanently or temporarily used for the Project are known as the Order Limits. The process by which this sifting was achieved is described in Chapter 4.

1.1.6 The Project is classified as a Nationally Significant Infrastructure Project (NSIP) and will require a Development Consent Order (DCO) to give consent to install the pipeline, under the Planning Act 2008 (the 2008 Act). The Project also falls within the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations), which require an Environmental Statement (ES) to be prepared and submitted with the application for development consent.

1.2 Purpose of the Report

1.2.1 This Scoping Report has been prepared to accompany a request for a Scoping Opinion from the Planning Inspectorate (prepared on behalf of the Secretary of State). It aims to provide the information necessary to accompany such a request, and inform both the Scoping Opinion and the formal consultation with statutory environmental bodies by the Planning Inspectorate on the request.

1.2.2 Scoping is an important part of the environmental assessment process. It provides information on the proposals and identifies where the proposals may give rise to significant environmental effects. It sets out the intended scope of the environmental impact assessment to be reported in the ES.

1.2.3 The Scoping Report identifies existing features along the route such as ecological designations, residential areas, important heritage assets, plus surface and groundwater. This is called the “baseline”. It is assumed for the purposes of this report that the future baseline prior to construction would be the same as existing conditions. Where the baseline is likely to alter, for example where development is known to have been planned, this is highlighted within the relevant chapter.

1.2.4 The scoping process then uses the baseline to initially assess whether there are likely to be any significant effects on those baseline features. If there are, then these features and effects would be assessed in detail and reported in the ES.

1.2.5 As part of the design development process, the route of the pipeline has been influenced by the desire to reduce potentially significant effects. This is described in detail in Chapter 4. For example, the route seeks to avoid buildings and Ancient Woodland. In addition, a Code of Construction Practice (CoCP) will be prepared, which is currently in outline form within Appendix 1.

1.2.6 The CoCP is a document which will set out the working methods and good practice mitigation to which the pipeline construction contractors for the Project will be required to work, in order to reduce effects from the Project. It will be updated and refined as the EIA process progresses, and will be included in the application for development consent.

1.2.7 In addition to the CoCP, an outline Construction Environmental Management Plan (CEMP) will be produced for submission with the ES. This document is not available for the purposes of scoping but its function is described later in this chapter. It would be the responsibility of the contractor to produce the full CEMP.

1.2.8 The scoping process takes into consideration design features and measures described in Chapters 3 and 4 to ‘scope out’ certain aspects from the environmental impact assessment (EIA). The Scoping Report demonstrates that aspects scoped out would be unlikely to experience or cause significant environmental effects related to the Project. In this way, further study is focussed on the features with potential to experience, or cause, a significant effect (together with those where insufficient data are currently available and a precautionary approach indicates potential for a significant effect).

1.2.9 Attention is therefore concentrated within the ES on those areas where there could be a significant effect, and solutions would be presented to reduce those effects. This is expected to result in a more proportionate ES which is easier to read and addresses the important issues fully.

1.3 Project Justification

1.3.1 As stated in Section 1.1, provision of a replacement pipeline between Boorley Green and the West London Terminal storage facility in Hounslow is of national importance (defined as an NSIP). The justification for the Project is outlined within this section.

1.3.2 The Overarching National Policy Statement for Energy (NPS EN-1) sets out the Government's assessment of the importance of energy infrastructure and is summarised below.

1.3.3 In para 3.1.1 the Government identifies that the UK needs new energy infrastructure to achieve energy security.

1.3.4 Paragraph 3.2.1 notes that "*Energy underpins almost every aspect of our way of life. …. It is difficult to overestimate the extent to which our quality of life is dependent on adequate energy supplies*".

1.3.5 Paragraph 3.9.3 identifies that "*The UK needs to ensure it has safe and secure supplies of the oil products it requires. Sufficient fuel and infrastructure capacity are necessary to avoid socially unacceptable levels of interruption to physical supply and excessive costs to the economy from unexpectedly high or volatile prices. These requirements can be met by sufficient, diverse and reliable supplies of fuel, with adequate capacity to import, produce, store and distribute these supplies to customers. This in turn highlights the need for reliable infrastructure including refineries, pipelines and import terminals and the need for flexibility in the supply chain to accommodate the inevitable risk of physical outages.*"

1.3.6 Paragraph 3.9.4 notes that "*Finished petroleum products are distributed from the refineries to around 50 major distribution terminals in the UK by pipeline (51%) …".*

1.3.7 Para 3.9.5 identifies the importance of this pipeline network, highlighting that it provides "*… an extensive network of private and Government owned pipelines in the UK, with around 4,800km of pipeline currently in use. The 2,400km of privately owned UK pipeline network carries a variety of oil products from road transport fuels to heating oil and aviation fuel. The network provides an efficient and robust distribution system across the UK and directly provides jet fuel for some of the UK's main airports.*

1.3.8 Paragraph 3.9.8 states that "…*the IPC should expect to receive a small number of significant applications for oil pipelines and start its assessment from the basis that there is a significant need for this infrastructure to be provided*".

1.3.9 The Ministerial Foreword to the Department for Business, Energy and Industrial Strategy's consultation paper 'Downstream Oil Resilience Consultation Paper' (2017) states that "*The Government are committed to ensuring a secure and resilient energy supply".* Also that *"Ensuring fuel continues to flow is therefore an essential part of our work",* and *"the ability of the UK supply system to protect the continuity of fuel supplies and be resilient to disruptions needs to be maintained"*. In the introduction to the same document it is stated that the fuel supply sector "*plays a key role in our energy security, supplying products that are vital to our economy and way of life".*

1.3.10 In the Government's response to the consultation (April 2018), the Government repeated the importance of the "*ability of the system to protect the continuity of fuel supplies and be resilient to disruptions must be maintained*". The paper states that the Government is committed to ensuring a secure and reliable energy supply and "*is working to ensure that the ability of the supply system to protect the continuity of fuel supplies and be resilient to disruptions is maintained*".

1.3.11 The existing pipeline was built between 1969 and 1972. It runs from the Fawley Refinery near Southampton to the West London Terminal storage facility in Hounslow. The existing pipeline was originally used to transport a type of oil used by large industrial facilities and oil-fired power stations.

1.3.12 During the 1980s when natural gas became more widely available in the UK, the need for this type of heating fuel dwindled. With the growth of air travel, the pipeline was then used to transport aviation fuel.

1.3.13 The existing pipeline is working adequately, but the need for inspections and maintenance is increasing.

1.3.14 There are two other below ground pipelines which run close to the existing pipeline. These are a gas pipeline and another Esso oil pipeline. They were consented together by the Esso Petroleum Act 1961.

1.3.15 In 2002, 10km (6 miles) of pipeline were replaced between Hamble and Boorley Green in Hampshire.

1.3.16 The purpose of the current Project is to replace the remaining 90km (56 miles) of pipeline from Boorley Green to the West London Terminal storage facility in Hounslow. This pipeline would go via Alton, Hampshire and connect to the existing pipeline infrastructure. The pipeline needs to be constructed as a replacement pipeline. This is because the existing pipeline cannot be taken out of operation for more than short periods, to ensure secure supplies to customers.

1.3.17 The Project will replace the existing pipeline, which has an internal diameter of about 25cm (10 inches), with a new that has an internal dimeter of about 30cm (12 inches) pipeline with an internal diameter of about 30cm. This increased pipeline diameter will enable a quick response to both seasonal and shorter term changes in aviation fuel demand.

1.3.18 Replacement of the pipeline will maintain the supply of aviation fuel for years to come. As a responsible operator, Esso is committed to safe operations that include maintaining, repairing and, where appropriate, replacing pipelines.

1.3.19 Replacement of the pipeline is being undertaken now to allow appropriate time for design, consultation, the Development Consent Order process and installation, whilst also maintaining the operation of the existing pipeline.

1.3.20 At this stage Esso has considered alternative ways of transporting fuel, particularly by road. This pipeline will keep around 100 road tankers off the road every day (an estimate based on the volume of aviation fuel transferred from the Fawley Refinery to the West London Terminal storage facility via pipeline in 2015).

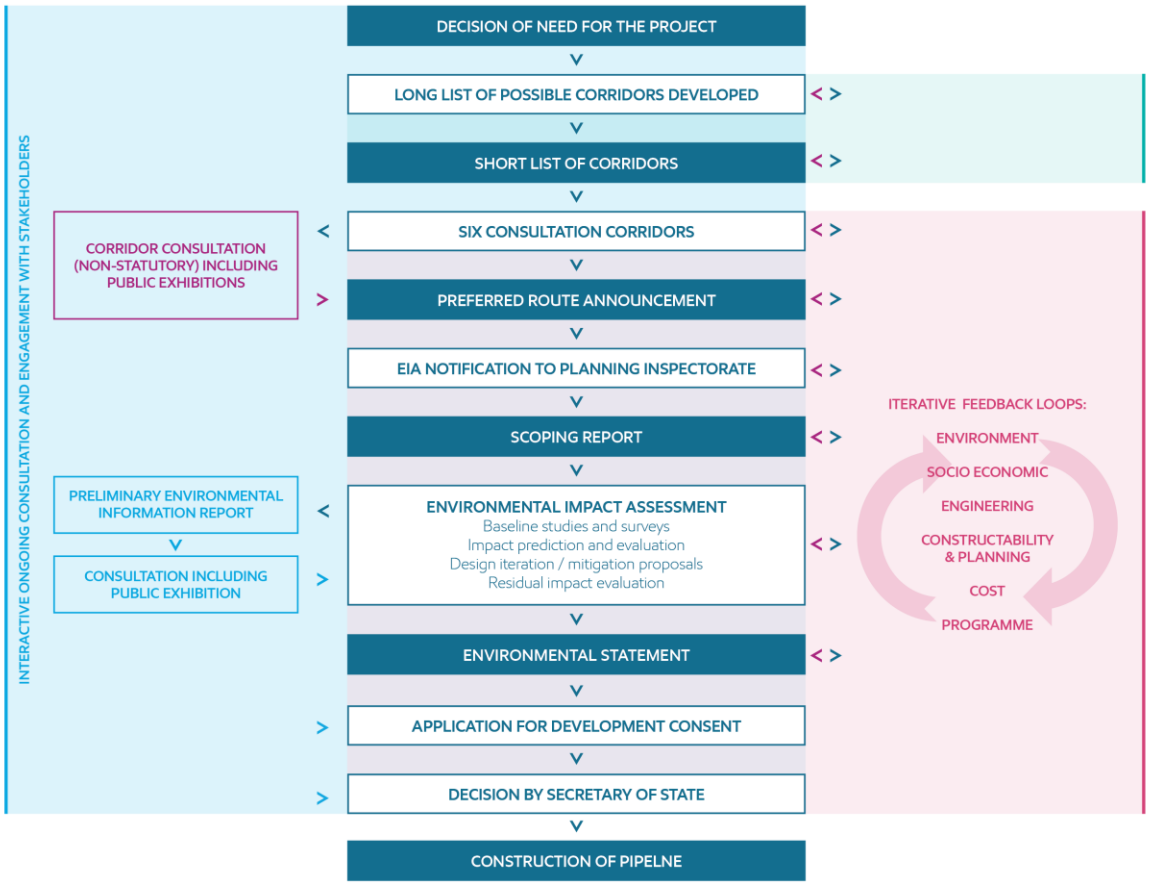
1.3.21 Para 4.1.3 of NPS EN-1 notes that decision makers for energy NSIPs should take into account *"its potential benefits including its contribution to meeting the need for energy infrastructure, job creation and any long-term or wider benefits"*. The Esso Fawley refinery directly employs over 1,000 people, with many more employed within the supply chain.

1.4 Approach to the Environmental Impact Assessment

1.4.1 The EIA process is laid down in European law by the Directive 2014/52/EU and ratified into UK law (for the purposes of this Project) within The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. The energy NPSs state Government policy and guidance within the regulations. This guidance has been used to inform the approach to EIA. Further regulatory and planning context is provided in Chapter 2.

1.4.2 The EIA process involves a series of steps as illustrated in Figure 1.2. This Chapter is concerned with the process up to the delivery of the Scoping Report. For details of the process beyond this point, please refer to Chapter 17 Next Steps.

Figure 1.2: The EIA process



EIA Screening / Notification

1.4.3 Under the Regulations, if a pipeline has a diameter of less than 800 millimetres it falls under the scope of Schedule 2. The Project pipeline would have a diameter of 300mm. Schedule 2 projects only require EIA if they are deemed likely to have significant effects on the environment by virtue of their nature, scale and location.

1.4.4 The Government's National Planning Practice Guidance states that EIA is likely to be required for pipelines exceeding an indicative threshold of 5km (3 miles) in length, and that the environmental sensitivity of the route should be considered. The current pipeline to be replaced is 90km (56 miles) in length.

1.4.5 The EIA Regulations require applicants to either (i) ask the Secretary of State to adopt a 'Screening Opinion' to determine if the Project requires EIA; or (ii) notify the Secretary of State in writing that they propose to provide an ES in respect of the development.

1.4.6 Given that the length of the Project route far exceeds the indicative threshold of 5km (3 miles), and sections of the route are environmentally sensitive, it is considered that this Project is a Schedule 2 development and an EIA is likely to be required by the Secretary of State. Therefore, a Screening Opinion has not been requested. The Secretary of State will be notified of the intention to submit an ES for the Project within the Scoping Report covering letter.

Approach to Scoping

1.4.7 Guidance has been taken from the Planning Inspectorate's Advice Note 7 (EIA Process, Preliminary Environmental Information and Environmental Statements, dated December 2017). This states that the EIA process should be proportionate and should only scope in aspects that are likely to result in significant effects. A scoping process has been undertaken to identify the issues to be included. The results are presented in this Scoping Report.

1.4.8 An extensive baseline has been constructed for each topic area as described in the individual chapters. Publicly available information has been used in conjunction with consultation and engagement with statutory and non-statutory bodies as outlined in each topic chapter. In addition, the corridor consultation held in March and April 2018 has informed the process and allowed for feedback from the local communities along the corridor options.

1.4.9 The scoping process has been developed on a receptor-based approach. This means that the topic chapters are based on receptors that may be affected by the Project (see Chapter 6 EIA Methodology).

1.4.10 A robust process has been used to scope aspects in or out from the EIA process based on Advice Note 7. Evidence has been provided to support these judgements within each chapter cross-referenced to the Planning Inspectorate (PINS) questions.

1.4.11 The Planning Inspectorate's Advice Note 7 states that the following questions should be used to justify scoping in or out of aspects:

1) Is there an impact pathway from the Proposed Development to the aspect/matter?
2) Is the aspect/matter sensitive to the impact concerned?
3) Is the impact likely to be on a scale that may result in significant effects to the aspect/matter?
4) Could the impact contribute cumulatively with other impacts to result in significant effects to the aspect/ matter?
5) Is there a method of avoidance or mitigation that would reduce the impact on the aspect/matter to a level where significant effects would not occur?
6) Is there sufficient confidence in the avoidance or mitigation method in terms of deliverability and efficacy to support the request?
7) Is there empirical evidence available to support the request?
8) Do relevant statutory consultees agree with the request?

9) Have you had regard to (a) relevant National Policy Statement(s) (NPS) and specifically any requirement stated in the NPS(s) in respect of the assessment of this aspect/matter?

1.4.12 Scoping has been based on the proposed Order Limits of the Project as described in Chapter 3 and shown on all Figures. The Order Limits are subject to on-going consultation. Order Limits are the limits set out in the DCO that include both the pipeline route and the temporary working areas that will be required to install the pipeline, such as access routes, working compounds and construction areas. The route within which the pipeline could be installed is called the Limits of Deviation. The actual physical placement of the pipeline within the Limits of Deviation is currently unknown.

1.4.13 As the Project spans over 90km (56 miles), for ease of locating parts of the Project, it has been split into eight Sections. These are lettered A to H. Within the topic chapters, these Sections have been referenced where possible.

1.4.14 To enable scoping, a degree of mitigation has been assumed. The mitigation considered for scoping is described in Chapters 3 and 4 of this report.

1.4.15 The CoCP will be submitted with the application documents as part of the ES, and therefore, it is considered that the measures can be relied upon as tertiary mitigation for the purposes of scoping. See Chapter 6 for definitions of types of mitigation.

1.4.16 In addition to the CoCP, an outline CEMP will also be developed. It will be the responsibility of the construction contractor to produce the full CEMP. Within this document will be a register of actions and commitments (REAC) which will define all mitigation and monitoring commitments. All mitigation contained within Chapter 4 will be included in this register, along with any additional measures identified during the EIA process.

1.4.17 The Planning Inspectorate (within Advice Note 7) suggests the information which the Scoping Report should contain. The list is reproduced here with an indication of which chapter of the Scoping Report addresses each item:

- an outline of the main alternatives considered and the reasons for selecting a preferred option (Chapter 4 - Design Development);
- results of desktop and baseline studies where available (topic Chapters 7 to 15);
- referenced plans presented at an appropriate scale to convey clearly the information and all known aspects associated with the Project (Volume 2 Figures);
- guidance and best practice to be relied upon, and whether this has been agreed with the relevant bodies (for example the statutory nature conservation bodies or local authorities) (Chapter 4 - Design Evolution, Appendix 1 – draft CoCP);
- methods used or proposed to be used to predict impacts and the significance criteria framework used (topic Chapters 7 to 16 and overall framework Chapter 6 – EIA methodology);
- any mitigation proposed and predicted residual impacts (Appendix 1 - Outline CoCP and embedded mitigation within Chapter 4 - Design Evolution);
- where cumulative development has been identified, how applicants intend to assess these impacts in the ES (Chapter 16 - Cumulative Effects);

- an indication of any European designated nature conservation sites that are likely to be significantly affected by the proposed development and the nature of the likely significant impacts on these sites (Chapter 7 - Biodiversity);
- key topics covered as part of the applicants' scoping exercise (Section 1.5); and
- an outline of the structure of the proposed ES (Chapter 6 – EIA Methodology).

Approach to the Environmental Statement

1.4.18 The EIA and production of the ES will follow the same proportionate approach. The topics within the Scoping Opinion will be further investigated and surveys undertaken following the strategies detailed within the Survey Methodology Report contained within Appendix 3. Further, ongoing consultation and engagement will be held with statutory and non-statutory consultees, and a further public consultation period held in autumn 2018. These would feed iteratively into the EIA.

1.4.19 Mitigation would be proposed where significant effects are predicted and remaining or residual effects identified. Proportionate monitoring with a specific purpose and timescale would be specified.

1.4.20 During the EIA process, a Preliminary Environmental Information Report (PEIR) will be produced to inform the public and other stakeholders of the likely significant environmental effects of the Project. This will be produced in autumn 2018 with the ES completed as part of the application for development consent in 2019.

1.5 Structure of the Scoping Report

1.5.1 The scoping process has been developed on a receptor-based approach. This means that the topic chapters are based on receptors that may be affected by the Project. Within those chapters, discussions regarding effects resulting from the construction and operation of the Project via the sources of environmental change e.g. noise, dust, construction traffic, land take and vegetation clearance, are presented.

1.5.2 The front six chapters of the Scoping Report provide information about the EIA process in general, and details of the Project.

1.5.3 Chapter 1 Introduction: provides a general introduction;

1.5.4 Chapter 2 the Regulatory Context: outlines the legislation and national planning policy applicable to the installation of a new aviation fuel pipeline. It also refers to Appendix 2 on regional and local planning policies;

1.5.5 Chapter 3: describes the Project in sufficient detail to inform scoping, including the preferred corridor and route of the pipeline, the expected construction programme and construction methods and principles;

1.5.6 Chapter 4: provides a history of the Project; how the Project design has been developed and how mitigation has been built into the design;

1.5.7 Chapter 5: outlines the consultation process, and how Esso has consulted with statutory and non-statutory bodies and members of the public;

1.5.8 Chapter 6 gives an indication of the EIA process and the methodology for the assessment of the 'scoped in' topic areas.

1.5.9 The main part of the report covers the 'scoped in' receptor topics: those aspects that could be affected by the Project. The topics covered are:

- Chapter 7: Biodiversity;
- Chapter 8: Water;
- Chapter 9: Historic Environment;
- Chapter 10: Landscape and Visual Effects;
- Chapter 11: Soils and Geology;
- Chapter 12: Land Use;
- Chapter 13: People and Communities;
- Chapter 14: Health Impacts;
- Chapter 15: Major Accidents; and
- Chapter 16: Cumulative Effects.

1.5.10 At the start of each of the topic chapters 7 to 16 is a description of where the chapter cross-references to other topics. There is also a brief summary of the competencies of the lead author of each chapter as required by Article 5 of the EU Directive.

1.5.11 Chapter 17: Next Steps contains a brief summary of what happens after the Scoping Report is submitted.

1.5.12 Chapter 18: References contains a full list of references used during production of this report.

1.5.13 A table of technical terms and abbreviations used within the report are situated at the front of the report for ease of use.

1.5.14 There are a number of appendices situated at the end of Volume 1. These contain information that the main report draws upon as follows:

- Appendix 1: Code of Construction Practice (outline). This is a high level outline of the CoCP. The full CoCP will set out the working methods and good practice mitigation to which the pipeline construction contractors for the Project will be required to work.
- Appendix 2: Regional and Local Planning Policy is a brief summary of the main policies in the area of the Project. More specific topic detail is contained within the topic chapters themselves.
- Appendix 3: Survey Methodology Report describes the way in which surveys are being carried out to investigate the baseline conditions.
- Appendix 4: Habitats Regulation Assessment (Stage 1).
- Appendix 5: Water Framework Directive Report (draft) and Flood Risk Assessment.
- Appendix 6: Historic Environment Inventory Lists.
- Appendix 7: Waste and Materials Technical Note.
- Appendix 8: Technical Notes. This appendix contains four technical notes. These consider sources of environmental change and feed into the topic chapters notably Chapter 13 People and Communities. They are:
  - Air quality;
  - Traffic and transportation;
  - Noise; and
  - Equality Impact Assessment.

1.5.15 The figures for the Scoping Report are contained within Volume 2. Their numbering follows that of their referencing Chapter. For example, the first figure for the Biodiversity chapter is Figure 7.1.

1.5.16 There are two topics which do not have their own topic chapter as they are covered by a number of different chapters. These are briefly described below.

Transboundary Effects

1.5.17 There is a requirement under the EIA Regulations to consider transboundary effects, i.e. those effects that could affect receptors within other countries. Each of the topic areas have considered the extent of effects for their receptors. During the scoping

process, there have been no transboundary effects identified. This topic has therefore been scoped out under PINS question 1, that there is no pathway for effects to be felt outside the UK.

Climate Change

1.5.18 National Policy Statement (NPS) EN-1 discusses the contributions that energy infrastructure developments and the infrastructure planning system make towards a low carbon economy, in line with the UK's national and international climate change commitments. NPS EN-4 (section 2.2) requires applicants to consider the resilience of projects to climate change. The EIA Regulations require "*consideration of the effects of developments on climate (for example greenhouse gas emissions, and impacts relevant to climate change adaptation), if these are factors likely to be significantly affected by the project*".

1.5.19 The Project will replace an existing pipeline which delivers aviation fuel to the West London Terminal storage facility, for use in UK airports, to fulfil existing obligations for fuel delivery. The future demand for aviation fuel by the aviation industry, and any environmental impacts of its use, is considered to be outside the scope of this project and is therefore scoped out of the EIA as an operational impact.

1.5.20 The upgraded pumps that are included as part the Project may require additional energy input, however no significant impact on climate change is expected to be likely and it is therefore scoped out.

1.5.21 No other elements of the pipeline's operation are expected to cause significant environmental impacts.

1.5.22 An assessment will be prepared in the ES to set out the likely impacts on climate change of the project, during construction, and the resilience of the project to climate change.

1.5.23 The influence of climate change on the project through the water environment is considered in Chapter 8 Water.

1.5.24 It is considered that should the replacement pipeline not be constructed, there would be two alternatives. As discussed in Section 1.3 above and Chapter 4 Design Evolution, the alternative to installing the replacement pipeline would either be in-line renewal of the existing pipeline or to transport the aviation fuel by tanker. In-line renewal has been rejected, as it would be impossible to maintain supply and replace the pipeline within the desired timeframe. It has been estimated that it would require 100 tankers per day to deliver the required quantity (based on Esso's 2015 data for its existing pipeline), which would lead to greater carbon emissions than pipeline transport.

Road Map

1.5.25 Due to the complexity of the scoping process and the interactions between each of the topic areas, a ‘road map’ has been developed to aid understanding of the structure of the report. This is provided in Figure 1.4 (Volume 2). The main contents of each chapter is bulleted. Related topics are then also listed with the chapter where they are to be found. The chart is colour coded so that a particular topic is always represented by the same colour. This should aid locating which topic chapter contains which sub-topics.

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Chapter 2
Regulatory Context

Scoping Report Volume 1

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2. Regulatory Context

2.1 Legislation

Directive 2014/52/EU

2.1.1 Environmental assessment is required under EU Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment (the EIA Directive).

2.1.2 The EIA Directive creates a consistent structure for EIA across the Member States of the EU and therefore sets out a number of deliverables which may be included within the EIA process. Where relevant to the Scoping Report, the contents of these deliverables have been presented in Chapter 1. A brief outline of the legal requirements is also provided here. The main deliverables required are:

- Screening Opinion (N.B. it is not mandatory to request a Screening Opinion);
- Scoping Opinion (N.B. it is not mandatory to request a Scoping Opinion); and,
- Environmental Statement.

2.1.3 Within these documents the following topic areas should be investigated:

- population and human health;
- biodiversity, specially species and habitats protected under Directive 92/43/EEC and 2009/147/EC;
- land, soil, water, air and climate;
- material assets, cultural heritage and landscape;
- the interaction between the factors referred to in preceding points
- expected effects deriving from vulnerability of the project to risks of relevant major accidents and/or disasters.

2.1.4 The EIA Directive has been implemented into UK law within a number of Regulations. The Regulations which are relevant to Nationally Significant Infrastructure Projects (NSIPs) are the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations). These Regulations potentially apply “in respect of a pipe-line which is intended to convey oil or gas”. The criteria for NSIPs are discussed in the National Planning and Energy Policy Section 2.2 in this report.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

2.1.5 The EIA Regulations implement the EIA Directive for NSIPs.

2.1.6 Under the Regulations paragraph 16 of Schedule 1, a scheme is Schedule 1 if it fulfils the following criteria:

16. Pipelines with a diameter of more than 800 millimetres and a length of more than 40 kilometres for the transport of

a) gas, oil or chemicals

b) carbon dioxide streams for the purposes of geological storage, including associated booster stations.

2.1.7 As set out in Chapter 1 Introduction, the replacement pipeline is considered to fall under the scope of Schedule 2 of the EIA Regulations.

2.1.8 National Planning Practice Guidance (paragraph 2.2.7) provides more guidance as to whether EIA would be advised. As set out in Chapter 1 Introduction (paragraph 1.4.5), it is assumed that the Project will require EIA, so a Screening Opinion has not been requested, and the Secretary of State is being notified of the intention to submit an ES for the Project within the Scoping Report covering letter.

2.1.9 The EIA Regulations state that the EIA must *"identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors*" with a repeat of the list of topics listed in 2.1.3 above.

2.1.10 Further information on the scope and methodologies used for EIA is contained within Chapter 6.

2.2 National Planning and Energy Policy

Planning Act 2008

2.2.1 The replacement pipeline is a Nationally Significant Infrastructure Project (NSIP) which will require a Development Consent Order (DCO) granted under the Planning Act 2008 (the 2008 Act). Section 21 of the 2008 Act applies to the construction of a cross-country pipeline (a pipeline whose length is intended to exceed 16.093 kilometres (10 miles)).

2.2.2 Section 104 of the 2008 Act outlines the importance of National Policy Statements (NPSs) to the decision making process when applications for development consent are under consideration. Section 104 (2) states:

'*In deciding the application the Secretary of State must have regard to—*

(a) any national policy statement which has effect in relation to development of the description to which the application relates (a "relevant national policy statement")'…

(d) any other matters which the [Secretary of State] thinks are both important and relevant to [the Secretary of State's] decision.

2.2.3 In this case there are two relevant National Policy Statements. These are:

- The Overarching National Policy Statement for Energy (EN-1); and,
- National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4).

Overarching National Policy Statement for Energy (EN-1)

2.2.4 National Policy Statement EN-1 sets out the Government's overarching policy with regard to the development of NSIPs in the Energy sector. It outlines the high level objectives, policy and regulatory framework. EN-1 emphasises the need for new energy projects to contribute to a secure, diverse and affordable energy supply. This is to support the Government's policies on sustainable development, in particular by mitigating and adapting to climate change.

2.2.5 EN-1 sets out detailed policies in respect of matters such as air quality and emissions, biodiversity, dust and odour, flood risk, historic environment, landscape, land use, noise and vibration, socio-economic, traffic and transport and waste management. These policies have been taken into account in the preparation of this Report.

2.2.6 EN-1 para 3.9.3 identifies that "*The UK needs to ensure it has safe and secure supplies of the oil products it requires. Sufficient fuel and infrastructure capacity are necessary to avoid socially unacceptable levels of interruption to physical supply and excessive costs to the economy from unexpectedly high or volatile prices. These requirements can be met by sufficient, diverse and reliable supplies of fuel, with adequate capacity to import, produce, store and distribute these supplies to customers. This in turn highlights the need for reliable infrastructure including refineries, pipelines and import terminals and the need for flexibility in the supply chain to accommodate the inevitable risk of physical outages.*"

2.2.7 Para 3.9.4 notes that "*Finished petroleum products are distributed from the refineries*

to around 50 major distribution terminals in the UK by pipeline (51%) …". Para 3.9.5 identifies the importance of this pipeline network, highlighting that it provides "*… an extensive network of private and Government owned pipelines in the UK, with around 4,800km of pipeline currently in use. The 2,400km of privately owned UK pipeline network carries a variety of oil products from road transport fuels to heating oil and aviation fuel. The network provides an efficient and robust distribution system across the UK and directly provides jet fuel for some of the UK's main airports*".

2.2.8 NPS EN-1 para 3.9.8 notes that any consideration of applications for new oil distribution pipelines should *"start its assessment from the basis that there is a significant need for this infrastructure to be provided."*

Oil and Gas Supply and Storage (EN-4)

2.2.9 National Policy Statement EN-4 specifically relates to gas supply infrastructure and gas and oil pipelines. Sections 2.19 - 2.23 provide guidance on oil and gas pipelines, and specific policies on noise and vibration, biodiversity, landscape and visual impacts, water quality and resources, soil and geology. These policies have also been taken into account in this Report and are further discussed within the topic chapters.

2.2.10 NPS EN-4 para 2.1.2 repeats the statements from NPS EN-1, noting that "*In particular, EN-1 sets out the Government's conclusion that there is a significant need for new major energy infrastructure generally (see Part 3 of EN-1)."*

National Planning Policy Framework

2.2.11 The National Planning Policy Framework (NPPF) identifies in paragraph 3 that it '*does not contain specific policies for nationally significant infrastructure projects for which particular considerations apply. These are determined in accordance with the decision-making framework set out in the Planning Act 2008 and relevant national policy statements for major infrastructure as well as any other matters that are considered both important and relevant (which may include the National Planning Policy Framework).*"

2.2.12 A draft revised NPPF was published for consultation on 5 March 2018, and the consultation closed on 10 May 2018. Whilst the proposed amendments to the NPPF are therefore in draft at this stage, the Government has indicated it intends to publish a final version in the summer of 2018, at which point the revised version will replace policy set out in the current NPPF (March 2012).

2.2.13 Whilst NPS EN-1 and EN-4 remain the prime decision making documents, where they do not provide guidance, each topic chapter will consider whether there is important and relevant guidance in the NPPF, or Local Plans that may require consideration by the decision making authority. At this stage it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State and it is included for completeness to allow the Secretary of State to make such a determination.

National Planning Practice Guidance

2.2.14 National Planning Practice Guidance includes specific guidance on EIA procedures including indicative thresholds for screening Schedule 2 projects.

2.2.15 The Guidance states that EIA is likely to be required for pipelines exceeding an

indicative threshold of 5km in length, and that the environmental sensitivity of the route should be considered.

Regional and Local Planning Policies

2.2.16 Regional and local planning policies have also been referenced within the Scoping process. The details of the status of these policies and documents where they are to be found are contained within Appendix 2.

2.2.17 Most do not have specific reference to NSIPs. However, the South Downs National Park Authority's emerging Local Plan does make particular mention. It is therefore discussed within Appendix 2.

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Chapter 3
Description of the Development

Scoping Report Volume 1

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3. Description of the Development

3.1 Overview

3.1.1 Esso Petroleum Company, Limited (Esso) intends to replace 90km of its 105km aviation fuel pipeline that runs from its Fawley Refinery near Southampton to its West London Terminal storage facility in Hounslow. In 2002, Esso replaced 10km (6 miles) of pipeline between Hamble and Boorley Green in Hampshire. It has now decided to replace the 90km (56 miles) between Boorley Green and the West London Terminal storage facility in Hounslow.

3.1.2 The existing pipeline was built between 1969 and 1972. It was originally installed to transport a type of oil used by large industrial facilities and oil-fired power stations. During the 1980s when natural gas became more widely available in the UK, the need for this type of heating fuel dwindled. With the growth of air travel, the pipeline was then used to transport aviation fuel.

3.1.3 The existing pipeline is working adequately, but the need for inspections and maintenance is increasing. Esso is starting the Southampton to London Pipeline Project (the Project) now to allow sufficient time to gain approval and install the replacement, while maintaining the safe and secure movement of fuel along the existing pipeline.

3.1.4 The Project involves installation of a pipeline, with an internal diameter of about 30cm (12 inches) between Boorley Green and the West London Terminal storage facility in Hounslow. The existing pipeline route between these locations is 90km (56 miles) long.

3.1.5 Pipelines have safely operated for many decades. Esso is making this investment now to make sure the replacement pipeline can supply fuel across the south east long into the future.

3.1.6 The design development carried out for the replacement pipeline is described in Chapter 4 (Design Evolution). Following sifting of the long list corridor options to create the short list (the term sifting is used to describe the process of comparing long list options to create the short list) and appraisal of shortlisted options to identify the favoured corridors, and also analysis of responses received from the pipeline corridor options consultation (non-statutory) carried out in March/April 2018, a preferred corridor for the replacement pipeline was selected and announced to the public on 30 May 2018.

3.1.7 The preferred corridor largely follows the route of the existing pipeline with the exception of locations where constraints require the corridor to be widened or diverted.

3.1.8 Since announcing the selection of the preferred corridor, Esso has continued to develop the route that follows the preferred corridor, and has released an initial working route via the Project's website and contacted affected landowners. Due to the length of time it takes to prepare the scoping materials, this report was based on an earlier draft of the route that followed the preferred corridor.

3.1.9 The replacement pipeline starts near Boorley Green, at the end point of the previously replaced pipeline. The route runs generally in a northeast direction, via

Esso's Pumping Station in Alton. It terminates at the West London Terminal storage facility.

3.1.10 A new pigging station (see Section 3.4) will be constructed close to the start point of the replacement pipeline near Boorley Green. This will allow inspection of the replacement pipeline and the previously replaced pipeline between Hamble and Boorley Green, which has a smaller internal diameter of around 25cm (10 inch). Inspection vehicles used inside the pipeline are known as Pipeline Inspection Gauges (PIGs).

3.1.11 The replacement pipeline will be routed through Alton Pumping Station to connect to existing infrastructure. It will end at an existing pigging station located at West London Terminal storage facility. This will be upgraded as part of the Project.

3.1.12 The replacement pipeline will be buried underground for its entire length. The minimum depth from the top of the pipe to the ground surface will be 1.2m in open cut sections. For trenchless crossings of railway lines and a number of roads, rivers and other major infrastructure, the depth would be greater to avoid existing services and physical obstructions.

3.1.13 Approximately ten remotely operated valves will be installed along the route of the replacement pipeline to allow isolation for maintenance or in case of emergency. Each valve will be installed within a sub-surface chamber located within a fenced enclosure (see Section 3.4).

3.1.14 A Cathodic Protection (CP) system will be used to protect the pipeline against corrosion. The CP system is buried underground with the exception of approximately six CP transformer rectifier cabinets, each of which would be located within an above ground cabinet (see Section 3.4). The CP system would mainly use existing infrastructure that is already in place, but will need additional connections including cabling to the existing ground beds (a ground bed is an array of electrodes, installed in the ground to provide a low resistance electrical path to ground or earth).

3.1.15 An overview of the route and Order Limits for the replacement pipeline developed for the Scoping Report is shown on Figure 3.1 (Volume 2). This figure also shows the locations of Fawley Refinery, Alton Pumping Station and the West London Terminal storage facility, as well as the route of the existing pipeline.

3.1.16 The working width for the route is typically 30m wide. This ensures flexibility for detailed routing and construction methodologies for pipeline installation. Where specific width restrictions exist, for example for street works in urban areas, the working width has been narrowed. When crossing through boundaries between fields where these include hedgerows, trees or watercourses, the working width would be reduced to 10m wide to reduce habitat loss (see Chapter 4).

3.1.17 For major crossings of trunk roads and motorways (including the M25 and M3) and some other main roads, railways (including numerous main and branch lines) and some watercourses (including the River Thames), specialist trenchless techniques will be used (see Section 3.11). At these locations, additional working space would be required, and therefore the Order Limits have been widened. The Order Limits have also been widened to accommodate construction compounds and a small number of pipeline route sub-options to allow for current engineering uncertainties.

3.1.18 Design development is ongoing (please see Chapter 4) and will continue through the

EIA process. The pipeline route and associated Order Limits will be further refined for inclusion in the application for development consent.

3.1.19 Once the replacement pipeline is installed and operational, it will be protected by an easement strip that extends 3m either side of the pipeline. This is an area where no building or other below ground activity is permitted to take place, to protect the pipeline from damage. Activities such as crop planting and gardening would still be allowed.

3.1.20 Taking the existing pipeline out of service, known as decommissioning, is covered by the original pipeline consent and therefore does not form part of this Project.

3.1.21 Decommissioning of the replacement pipeline is addressed in Section 3.10.

3.2 Design Principles

3.2.1 The design of the replacement pipeline will be developed in accordance with Esso design standards for fuel pipelines, relevant industry codes of practice and standards and the requirements of the Pipeline Safety Regulations 1996.

3.2.2 Key principles of the design include:

- a design life of 60 years;
- protection against corrosion;
- pressure sensors to allow continual remote monitoring;
- telemetry to allow remote operation of valves; and
- continual monitoring using leak detection software.

3.2.3 Further information regarding the development of the operational design for the replacement pipeline is contained within Chapter 4 (Design Evolution).

3.3 The Replacement Pipeline

3.3.1 This section summarises the design of the replacement pipeline that has been developed for Scoping. It includes general descriptions and characteristics of the route and Order Limits and an outline construction scenario.

3.3.2 At this stage of design development only indicative design information is available. This will be updated during the EIA process.

Route Description and Characteristics

3.3.3 To aid design development and EIA, the route and Order Limits were broken down into eight separate sections (Sections A to H) as follows:

- Section A – Boorley Green (south of Maddoxford Lane) to Bramdean (including the A272 crossing)
- Section B – Bramdean (after the A272 crossing) to Chawton (B3006 crossing)
- Section C – Chawton (B3006 crossing) to Crondall via Alton Pumping Station
- Section D – Crondall to Farnborough Airport (A327 crossing)
- Section E – Farnborough Airport (A327 crossing) to Colony Gate (B3015 crossing)
- Section F – Colony Gate (B3015 crossing) to Chertsey South (up to the A320/M25 approach)
- Section G – Chertsey South (from the A320/M25 approach) to Chertsey (including the M25, River Thames and M3 crossings)
- Section H – Chertsey (after the M3 crossing) to the West London Terminal storage facility

3.3.4 A brief general description and the characteristics of each of the eight sections of the route and Order Limits is provided in Table 3.1. Table 3.1 also includes an outline construction scenario for each of the sections.

3.3.5 Additional information regarding the types of construction techniques that could be used is provided in Section 3.6 and Section 3.11.

3.3.6 A key plan (Figure 3.2, Sheet 1 of 14) (Volume 2) and a set of more detailed 1:25,000 scale plans covering the eight sections (Figure 3.2, Sheet 2 of 14 to Sheet 14 of 14) (Volume 2) are also provided.

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Table 3.1 Route and Order Limits Section descriptions

Section No.	Name	Relevant Figure (Volume 2)	Section Length (approx.)	General description and characteristics	Outline construction scenario (Lengths estimated = approx. % of total Section Length)
Section A	Boorley Green to Bramdean	Figure 3.2 (Sheets 2, 3 and 4 of 14)	20km* (12 miles*)	This Section of the route and Order Limits is largely rural in character, running primarily through Grade 1-3 Agricultural Land. It spans the local authority areas of Eastleigh Borough and Winchester City Councils. The Section starts just to the north of the B3354 south of Boorley Green. It then crosses the Eastleigh to Fareham (railway) Line, Maddoxford Lane and the former Botley Park Golf Course. The Section then crosses the B2177 by Bishops Waltham where it enters the South Downs National Park (SDNP) and passes Upham. It then passes the village of Bramdean before ending just after the crossing of the A272.	Boorley Green Pigging Station Open cut trenching: 97.5% Trenchless crossings (3 **): 2% Street works: 0.5% Construction compounds: 10 Valves: 2
Section B	Bramdean to Chawton	Figure 3.2 (Sheets 4, 5 and 6 of 14)	15km* (9 miles*)	This Section of the route and Order Limits is largely rural in character, running primarily through Grade 1-3 Agricultural Land and lies mainly within the SDNP. It spans the local authority areas of Winchester City and East Hampshire District Councils. The Section starts just after the A272 crossing, running north of West Tisted. It runs through the Four Marks Golf Course and then crosses the A32, before running adjacent to the southern boundary of Chawton House Registered Park and Garden. The Section	Open cut trenching: 98.5% Trenchless crossings (1**): 1% Street works: 0.5% Construction compounds: 6 Valves: 1

Section No.	Name	Relevant Figure (Volume 2)	Section Length (approx.)	General description and characteristics	Outline construction scenario (Lengths estimated = approx. % of total Section Length)
				ends just outside the SDNP, after the B3006 crossing.	
Section C	Chawton to Crondall via Alton Pumping Station	Figure 3.2 (Sheets 6, 7 and 8 of 14)	15km* (9 miles*)	This Section of the route and Order Limits is largely rural in character. It spans the local authority areas of East Hampshire and Hart District Councils. The Section starts just outside the SDNP, after the B3006 crossing. It then runs to the south east of Alton before crossing the River Wey and the Alton to Waterloo (railway) Line to Alton Pumping Station. From Alton Pumping Station, it crosses the A31 and runs to the south east of Upper and Lower Froyle. The Section ends at Dippenhall Street to the south of the village of Crondall.	Open cut trenching: 97% Trenchless crossings (2**): 2.5% Street works: 0.5% Construction compounds: 6 Valves: 2 Alton Main Pipe Storage Compound
Section D	Crondall to Farnborough Airport	Figure 3.2 (Sheets 8, 9 and 10 of 14)	9km* (6 miles*)	This Section of the route and Order Limits runs through both rural and urban character areas. A significant proportion of this Section passes through land owned by the Ministry of Defence (MoD) and two Sites of Special Scientific Interest (SSSI) and a single European designated wildlife site. It spans the local authority areas of Hart and Rushmoor District Councils. The Section starts to the south of the village of Crondall. It heads north, crosses the Oak Park Golf Course, crosses the A287, before entering MoD land, crossing and then running	Open cut trenching: 86% Trenchless crossings (3**): 3.5% Street works: 10.5% Construction compounds: 9 Valves: 1

Section No.	Name	Relevant Figure (Volume 2)	Section Length (approx.)	General description and characteristics	Outline construction scenario (Lengths estimated = approx. % of total Section Length)
				alongside Naishes Lane to Quetta Park. From Quetta Park, the Section leaves MoD land and continues to follow Naishes Lane, after which it passes Fleet Business Park to cross the B3013. From the B3013, the Section passes the Vertu development site before re-entering MoD land. The Section crosses the north of Tweseldown Racecourse and Ewshot, the Bourley and Long Valley SSSI, and the Basingstoke Canal SSSI. The Section then passes along the northern boundary of Eelmoor Marsh SSSI after which it leaves MoD land. It then crosses Cody Technology Park and the western section of Southwood Golf Course finishing just after the crossing of the A327.	
Section E	Farnborough Airport to Colony Gate	Figure 3.2 (Sheets 10 and 11 of 14)	9km* (6 miles*)	This Section of the route and Order Limits runs through both rural and urban character areas. A proportion of this Section passes through land owned by the MoD. It spans the local authority areas of Rushmoor and Surrey Heath District Councils. This Section includes various sub-options as shown on Figure 3.2. It starts just after the A327 crossing, running north through the eastern section of Southwood Golf Course to Cove Road (B3014). After crossing Cove Road (B3014), the	Open cut trenching: 89.5% Trenchless crossings (3-4**): 3.5% Street works: 7% Construction compounds: 7 Valves: None.

Section No.	Name	Relevant Figure (Volume 2)	Section Length (approx.)	General description and characteristics	Outline construction scenario (Lengths estimated = approx. % of total Section Length)
				Section crosses the South Western Main (railway) Line to the west of Farnborough, before running east and through Queen Elizabeth Park to the north of Farnborough Station where it crosses the A325. The Section then crosses Farnborough Hill School, after which it crosses the North Down (railway) Line at Farnborough North and the A331. It then crosses the Frimley Hatches, Ascot to Guildford (railway) Line and B3411, passing through Frimley Green. The Section then crosses MoD land at Frith Hill, running through Pine Ridge Golf Course, finishing immediately after the B3015 at Colony Gate.	
Section F	Colony Gate to Chertsey South	Figure 3.2 (Sheets 11, 12 and 13 of 14)	17km* (11 miles*)	This Section of the route and Order Limits runs through both rural and urban character areas, including one area of land owned by the MoD and also two SSSI. It spans the local authority areas of Surrey Heath and Runnymede District Councils. The Section starts immediately after the B3105 at Colony Gate, where it enters MoD land associated with Pirbright Ranges, and Colony Bog and Bagshot Heath SSSI. It continues north running adjacent to the B3105, before turning east to follow Red Road (B311). It then crosses Red Road	Open cut trenching: 89.5% Trenchless crossings (3-5 **): 3.5% Street works: 7% Construction compounds: 12 Valves: 2

Section No.	Name	Relevant Figure (Volume 2)	Section Length (approx.)	General description and characteristics	Outline construction scenario (Lengths estimated = approx. % of total Section Length)
				(B311), leaving the MoD land at Turf Hill and the SSSI just before Guildford Road. The Section then crosses the Guildford Road, the A322, Windlemere Golf Course and Windle Brook. The Section then continues generally north east and includes two sub-options due to the Chobham Common SSSI between Windlesham Road and the B386. The first sub-option to the north crosses the B383 to follow the existing pipeline route across Chobham Common SSSI (also a National Nature Reserve, Special Area of Conservation and Special Protection Area), after which it crosses Fox Hills Golf Course, ending at the B386. The second sub-option to the south crosses the B383 further south and then turns southeast to almost completely avoid Chobham Common SSSI, turning northeast at Dunstall Green. The south of the two sub-options then passes between Queenwood and Foxhills golf courses before re-joining the north sub-option at the B386. The Section then crosses the B386 before ending at the playing fields to the north of Salesian School and the approach to the A320/M25.	

Section No.	Name	Relevant Figure (Volume 2)	Section Length (approx.)	General description and characteristics	Outline construction scenario (Lengths estimated = approx. % of total Section Length)
Section G	Chertsey South to Chertsey	Figure 3.2 (Sheet 13 of 14)	4km* (2.5 miles*)	This Section of the route and Order Limits is largely urban in character, but includes a single SSSI. It spans the local authority areas of Runnymede and Spelthorne District Councils. The Section starts at the approach to the A320/M25, and after crossing the A320/M25 continues through Abbey Manor Golf Course. It then crosses the Chertsey Branch (railway) Line between Chertsey and Addlestone stations, before crossing the A317. After the A317, the Section passes through the sports fields associated with Philip Southcote School. There are then two sub-options for the crossing of the River Thames in the area of Dumsey Meadow SSSI. The first sub-option to the west follows the existing pipeline route across Dumsey Meadow SSSI. The second sub-option to the east is designed to avoid the Dumsey Meadow SSSI. Both of the sub-options include crossings of the B375 and M3. The sub-options meet immediately after the crossing of the M3, where this Section ends.	Open cut trenching: 79.5% Trenchless crossings (4-5 **): 15% Street works: 5.5% Construction compounds: 2 Valves: 1

Section No.	Name	Relevant Figure (Volume 2)	Section Length (approx.)	General description and characteristics	Outline construction scenario (Lengths estimated = approx. % of total Section Length)
Section H	Chertsey to the West London Terminal storage facility	Figure 3.2 (Sheets 13 and 14 of 14)	8km* (5 miles*)	This Section of the route and Order Limits is largely urban in character. It spans the local authority area of Spelthorne Borough Council and ends just within the London Borough of Hounslow. The Section starts after the crossing of the M3, following Littleton Lane north, before crossing the B376 Shepperton Road. It then goes north to western edge of the Queen Mary Reservoir, at which point there are two sub-options. The east sub-option follows the existing pipeline route, crossing the reservoir inlet channel and following the toe of the reservoir past Laleham Substation and across the Staines Reservoirs Aqueduct and B377 to the crossing of the Staines By-Pass (A308). The west sub-option diverts away from the western edge of the reservoir, crossing the B377 and reservoir inlet channel further west, before turning north. It then proceeds either through the sports field of Matthew Arnold School or an alignment further east, after which it crosses the Staines Reservoirs Aqueduct. The west sub-option then meets back up with the east sub-option at the Staines By-Pass (A308). After crossing the Staines By-Pass (A308), the Section continues north, crossing the	Open cut trenching: 81.5% Trenchless crossings (6-7 **): 5.5% Street works: 13% Construction compounds: 9 Valves: None Modifications to West London Terminal storage facility Pigging Station

Section No.	Name	Relevant Figure (Volume 2)	Section Length (approx.)	General description and characteristics	Outline construction scenario (Lengths estimated = approx. % of total Section Length)
				Waterloo to Reading (railway) Line close to Ashford Station. It then crosses the B378 and passes through the sports fields of St James Senior Boys School. After St James Senior Boys School, the Section proceeds north to cross the A30, before finishing at the end point at the West London Terminal storage facility.	

* The approximate 'Section Length' of each of the Sections (A to H) has been estimated. This is based on the main route options most closely aligned with the route of the existing pipeline. Therefore, the estimates do not include consideration of all possible routing alternatives and sub-options. The 'Section Length' estimates have also been rounded to the nearest kilometre, with conversions from kilometres to miles being rounded to the nearest half a mile.

** The numbers, locations and lengths of trenchless crossings have not been confirmed for Scoping. However, an initial estimate of the number of trenchless crossings for each Section (A-H) has been provided. This is combined with an estimate of the percentage of the proportion of the main route options that is expected to be installed using trenchless techniques at this stage of the design. As the numbers, locations and lengths of trenchless crossings have not been confirmed for Scoping, it has not been possible to include visualisation of trenchless crossings on Figures 3.2 (Sheets 2 to 14 of 14) (Volume 2).

3.4 Above Ground Installations and Permanent Infrastructure

3.4.1 This section summarises the design of new permanent above ground installations (AGIs) and minor above ground infrastructure that will need to be constructed for the replacement pipeline. Information is also provided regarding modifications that will be required to machinery and equipment located within permanent AGIs that already exist. At this stage of design development only indicative design information is available. This will be updated during the EIA process.

New Pigging Station near Boorley Green

3.4.2 The approximate location of the new pigging station is shown on Figure 3.2 (Sheet 2 of 14) (Volume 2). It should be noted that the exact location of the new pigging station is yet to be confirmed.

3.4.3 The pigging station will contain valves, a PIG receiver with an internal diameter of around 25cm (10 inches), and a PIG launcher with an internal diameter of around 30cm (12 inches). It would also include an above ground fuel drainage sump tank which is normally empty.

3.4.4 The pigging station will be provided with connections to existing electrical and telecoms utilities associated with the existing pipeline infrastructure.

3.4.5 The pigging station will be located within a fenced compound (approximately 25m x 20m). Approximately 3m high security fencing, typically incorporating a pedestrian gate and a double access gate for vehicles, would be installed around the perimeter of the pigging station compound. The compound for the new pigging station would not be permanently lit.

3.4.6 An indicative layout design for the new pigging station is shown on Figure 3.3. A photograph of a typical existing pigging station is also provided in Figure 3.4.

Figure 3.3 Indicative layout of new pigging station near Boorley Green

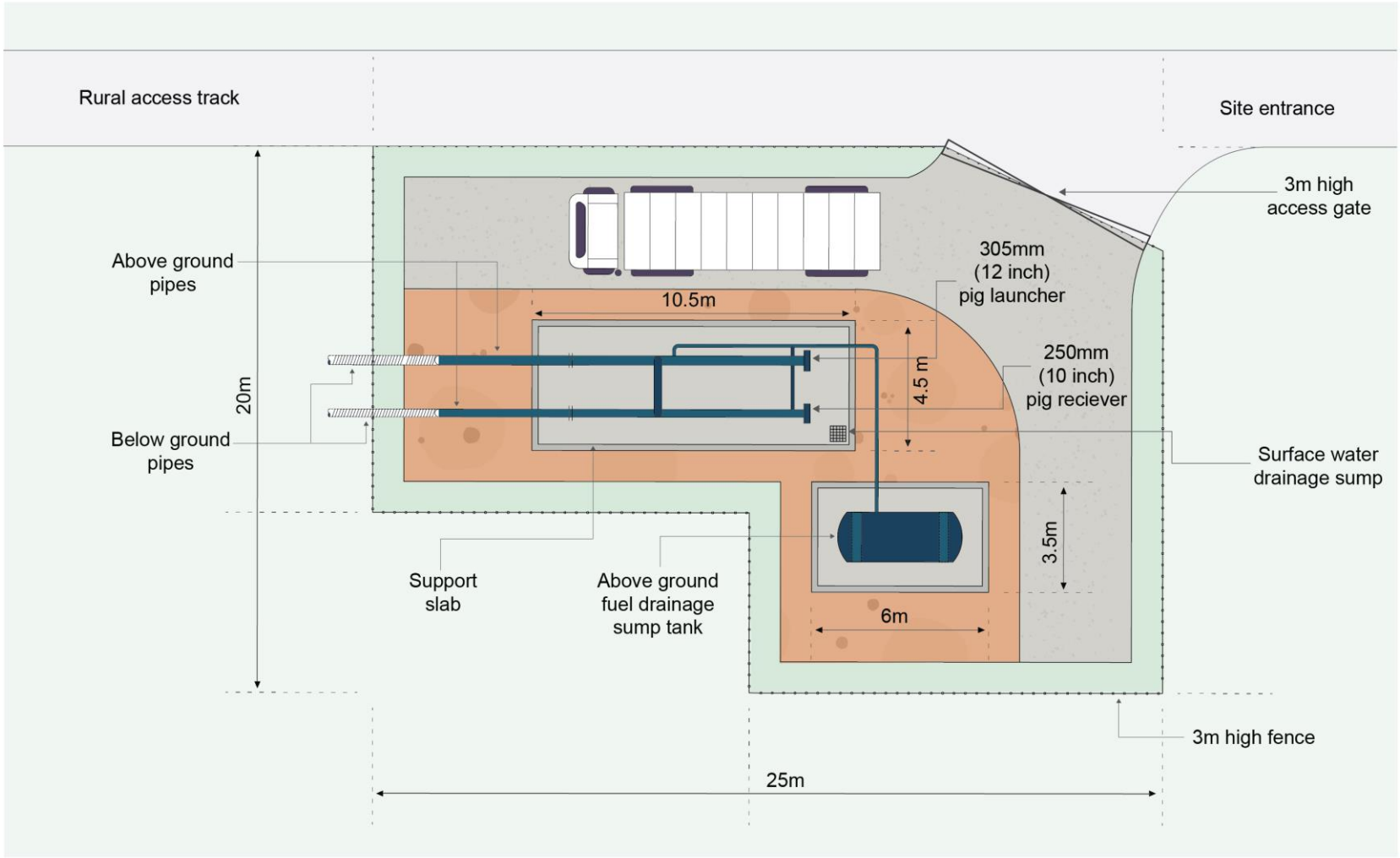


Figure 3.4 Photograph of an existing pigging station

Valves

3.4.7 Approximately ten remotely operated in-line valves will be installed along the replacement pipeline route to allow isolation for maintenance or in case of emergency.

3.4.8 The valves will be installed below ground level in chambers, with only limited above ground visible elements including secure chamber access covers and a control cabinet.

3.4.9 The valves will be powered by connections to existing electrical and telecoms utilities in nearby roads. The valves will be remotely operated from the pipeline control centre located at the West London Terminal storage facility.

3.4.10 Each valve will be located within a fenced enclosure (approximately 5m x 3m). Approximately 2m high security fencing, typically incorporating a pedestrian access gate, would be installed around the perimeter of each valve enclosure. The enclosures will not be permanently lit.

3.4.11 An indicative layout design for a typical valve enclosure is shown on Figure 3.5. A photograph of an existing valve enclosure is also provided in Figure 3.6. The indicative locations of valves are shown on Figures 3.2 (Sheet 2 of 14 to Sheet 14 of 14) (Volume 2).

Figure 3.5 Indicative valve enclosure layout

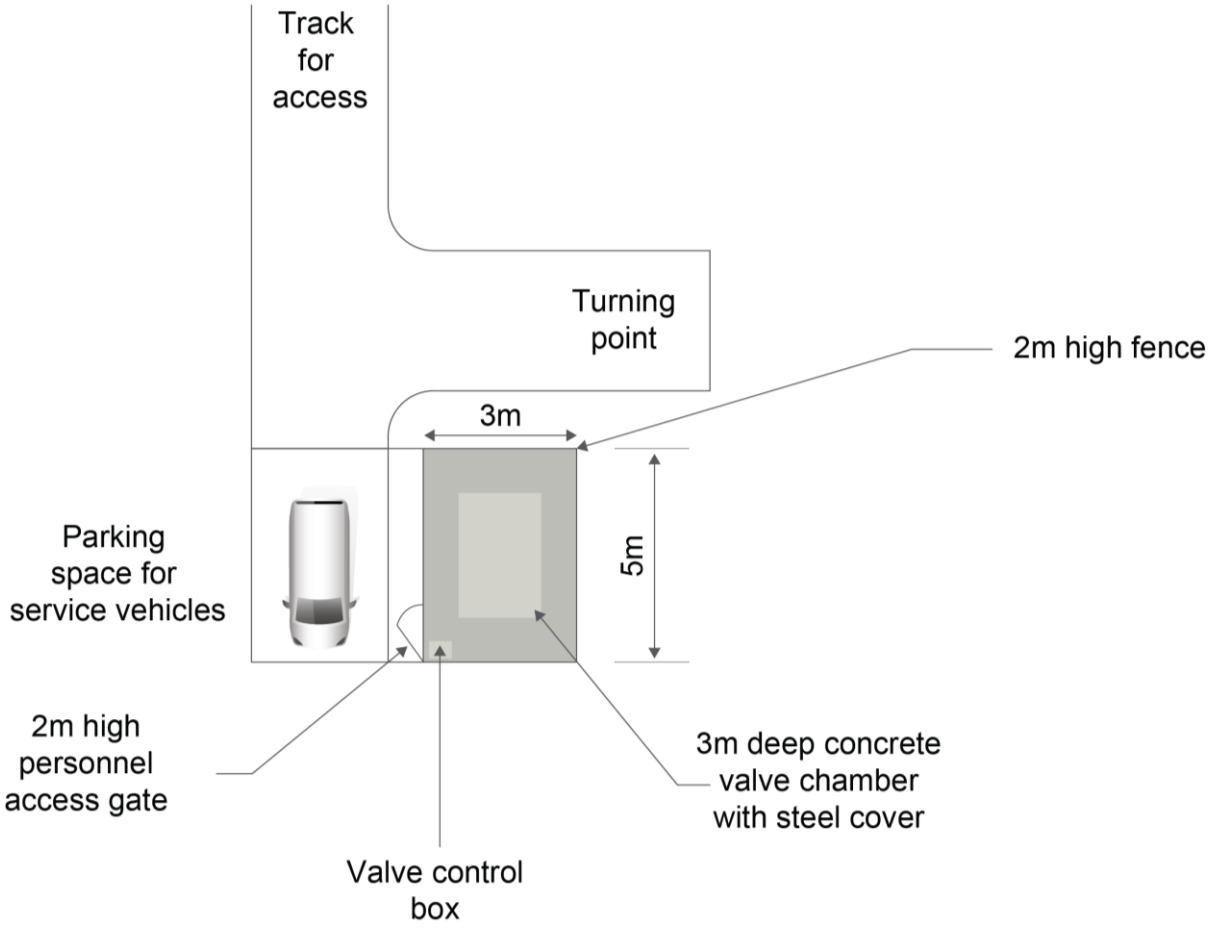


Figure 3.6 Photograph of an existing valve enclosure and flight marker post

Cathodic Protection (CP) Transformer Rectifier Cabinets

3.4.12 The CP system will protect the existing pipeline against corrosion. Most elements of the CP system including cabling and ground beds are buried below ground and not visible. Where possible, the ground beds for the existing pipelines will be used as part of the CP system for the replacement pipeline.

3.4.13 About six new above ground CP transformer rectifier cabinets would need to be sited close to the replacement pipeline to supply power to the CP system. These would replace the existing CP transformer rectifier cabinets and it is anticipated that they would be installed in the same or similar locations to those for the existing pipeline.

3.4.14 The CP transformer rectifier cabinets will be powered by connections to existing electrical and telecoms utilities associated with the CP system for the existing pipeline.

3.4.15 Figure 3.7 includes a photograph of an existing CP transformer rectifier cabinet.

Figure 3.7 Photograph of an existing CP transformer rectifier cabinet

3.4.16 The CP system would also include small above ground CP test posts, which are installed approximately every 1km of the existing pipeline route, usually placed directly above the pipeline. Similar CP test posts would need to be installed around every 1km of the replacement pipeline route. The colour, appearance and size of a typical CP test post is very similar to that of a pipeline marker post (as described below and shown on Figure 3.8).

Pipeline Markers

3.4.17 The replacement pipeline will be marked at all road crossings and boundaries by installing new industry standard marker posts.

3.4.18 A photograph of an existing industry standard marker post is included in Figure 3.8.

Figure 3.8 Photograph of a typical Industry standard marker post

3.4.19 The route of the replacement pipeline would also be marked with new red and black colour coded flight marker posts at a frequency of about 500m apart. These would be for use when the pipeline is inspected by helicopter.

3.4.20 A photograph of an existing flight marker post is included in Figure 3.6.

Modification of existing pigging station at the West London Terminal storage facility

3.4.21 The existing pigging station at the West London Terminal storage facility would be modified, including installation of a new PIG receiver with an internal diameter of around 30cm (12 inches), and tied in to the end of the replacement pipeline.

3.4.22 The location of the existing pigging station at the West London Terminal storage facility is shown on Figure 3.1 and Figure 3.2 (Sheet 14 of 14) (Volume 2).

3.5 Temporary Infrastructure for Construction

3.5.1 This section summarises the design of the main elements of temporary above ground infrastructure that will need to be provided for the installation of the replacement pipeline, AGIs and associated permanent infrastructure, as developed for Scoping. Information is also provided regarding modifications that will be required to equipment that already exists. At this stage of design development only indicative design information is available. This will be updated during the EIA process.

Alton Pumping Station Main Pipe Storage Compound

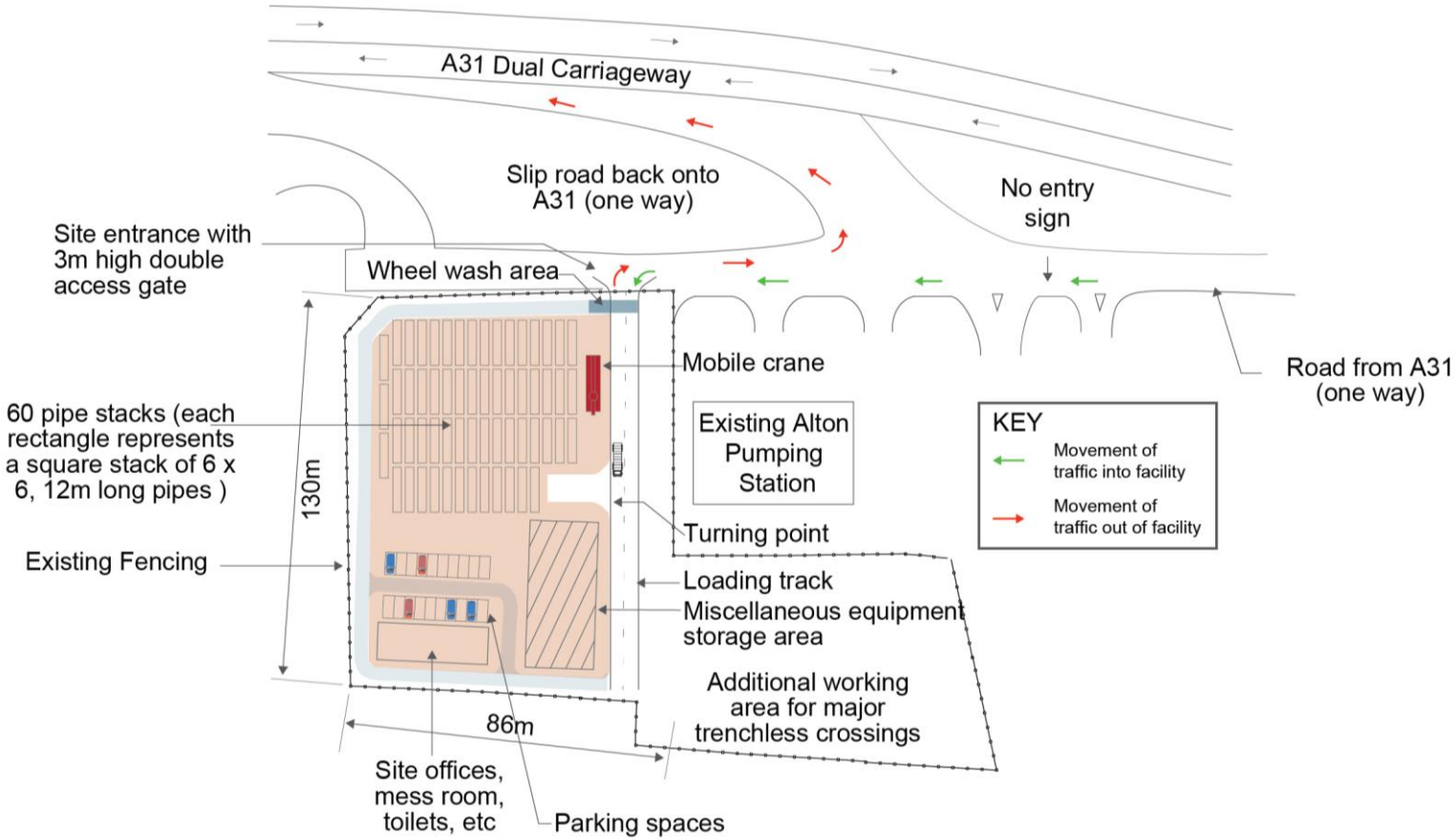
3.5.2 A main pipe storage compound would be established before commencement of the main construction works for the purposes of accepting deliveries of pipe. The compound would be used for storage of pipe prior to transfer by road to the replacement pipeline construction areas. The compound would include staff welfare facilities.

3.5.3 The main pipe storage compound at Alton will be located within an existing fenced area (approximately 130m x 86m). Pedestrian and vehicle access gates would be installed at the entrance to the compound.

3.5.4 The main pipe storage compound may require lighting to ensure safety and security, especially in the winter months. The use of any such lighting would be in accordance with relevant industry good practice standards as outlined within Chapter 4 and to be included in the Code of Construction Practice (CoCP).

3.5.5 An indicative layout design for the main pipe storage compound at Alton Pumping Station is shown on Figure 3.9. The location of the main pipe storage compound is shown on Figure 3.2 (Sheet 7 of 14) (Volume 2).

Figure 3.9 Alton pumping station main pipe storage compound layout



Temporary Construction Compounds

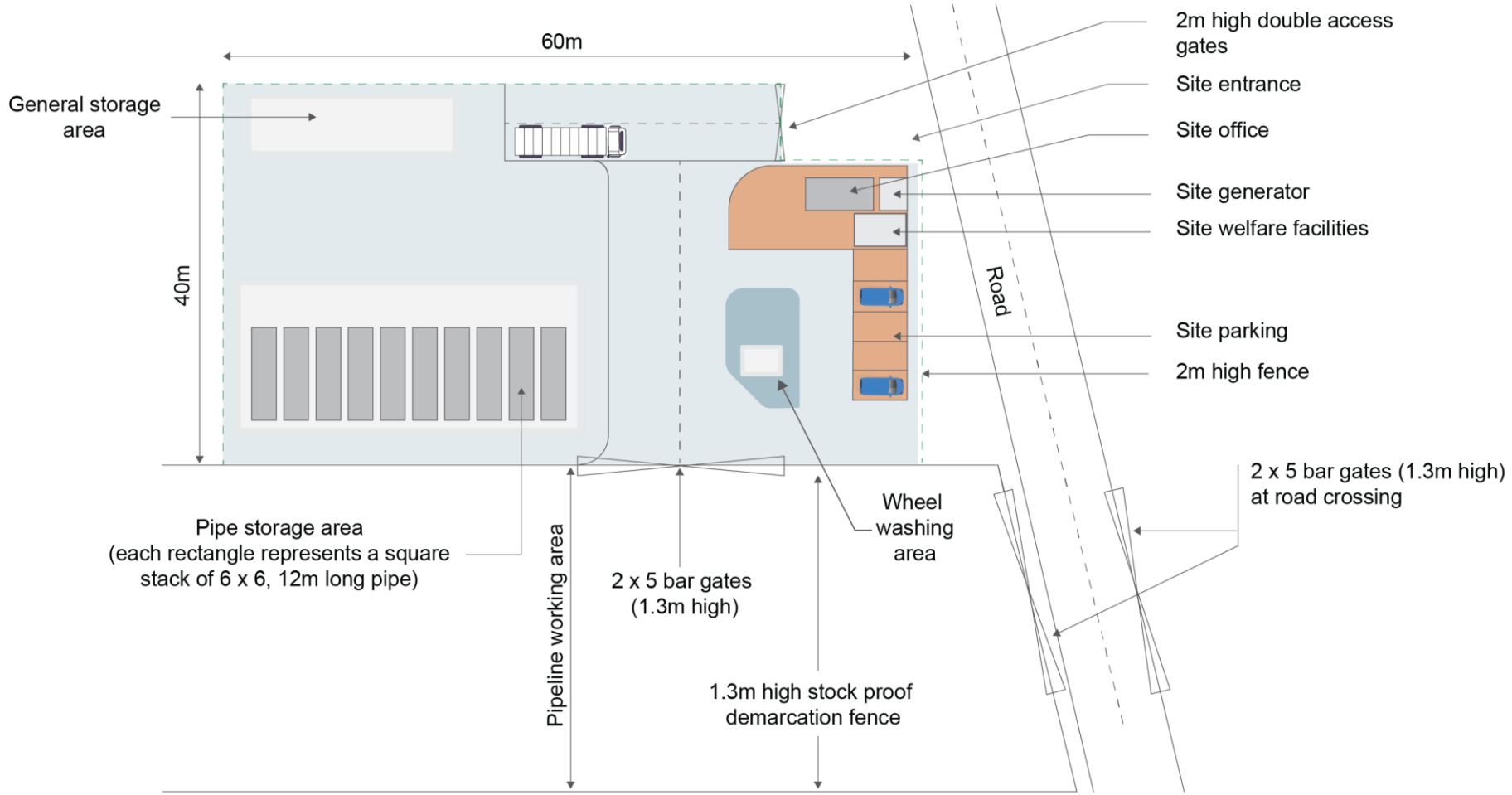
3.5.6 Temporary compounds would be established before commencement of the main construction works for the storage of pipe, materials, plant and equipment. The fenced compounds would include staff welfare facilities, waste storage, and wheel washing areas. The temporary compounds would include hardstanding areas, with apron and haul road areas comprising stone laid on a geotextile membrane.

3.5.7 Sizes would vary, but would have a fenced area (approximately 40m x 60m) for a typical rural construction compound. Approximately 2m high temporary fencing, incorporating both pedestrian and vehicle access gates, would be installed around the perimeter of each construction compound.

3.5.8 The construction compound may require lighting to ensure safety and security, especially in the winter months. The use of any such lighting would be in accordance with relevant industry good practice standards as outlined within Chapter 4 and to be included in the CoCP (Appendix 1).

3.5.9 An indicative layout design for a typical rural construction compound is shown on Figure 3.10. Indicative locations of rural compounds have been incorporated into the Order Limits for the replacement pipeline shown on Figures 3.2 (Sheet 2 of 14 to Sheet 14 of 14) (Volume 2).

Figure 3.10 Indicative temporary rural construction compound layout



Temporary Access for Construction

3.5.10 Temporary access tracks would be provided to link the pipeline construction areas to the local road network. Where required, temporary access tracks would be constructed of stone laid on a geotextile membrane.

3.5.11 The access tracks would be fenced and gated to aid control of vehicle access to and exit from the construction areas from the local road network.

3.5.12 The access tracks may require lighting to ensure safety and security, especially in the winter months. The use of any such lighting would be in accordance with relevant industry good practice standards as outlined within Chapter 4 and will be included in the CoCP.

3.5.13 Indicative locations of temporary access tracks have been incorporated into the Order Limits for the replacement pipeline.

3.6 Pipeline Construction

3.6.1 Construction of the replacement pipeline would be undertaken by contractors employing specialist pipeline staff.

3.6.2 The replacement pipeline construction works will mainly take place in rural areas using standard construction methodologies and sequences. However, the unavoidable routing of the replacement pipeline through a number of constrained built up urban areas requires a more complex construction process.

3.6.3 Open cut trenching methods would be used for the majority of the route. The crossings of trunk roads, motorways and railways and a number of other roads and rivers will be carried out using trenchless techniques.

3.6.4 An overview of standard construction methodologies and sequences for both rural and urban areas is provided within the remainder of this section. Summary information regarding typical pipeline construction techniques is also provided within Section 3.11.

Pipeline Construction in Rural Areas

3.6.5 Typical methods and sequencing for pipeline construction in rural areas are summarised in this section. These have been developed to allow the pipeline to be constructed efficiently across areas of rural land whilst reducing impacts to the surrounding environment.

Working Area Preparation

3.6.6 All working areas will need to be prepared prior to installation of the pipeline. This would generally consist of:

- Erecting advance warning signs at road crossings.
- Opening the entrance to the working area through field boundaries.
- Making sure that services are well protected where the access/egress to compounds are created.
- Erecting ‘goal post’ protection and location/warning notices where overhead cables are present. These govern the height at which plant can pass safely underneath.
- Opening entrances to subsequent field boundaries.
- Installing temporary watercourse crossings to maintain uninterrupted flows.
- Pruning and protecting trees.
- The location of all known buried services would be identified, marked and surveyed, including digging of trial holes where appropriate. Location/warning notices would be erected for all known services.

Temporary Fencing

3.6.7 The route of the pipeline will be fenced prior to and throughout the construction period. The type of fencing required will depend on assessment of local livestock, trespass and security risks. Removal of temporary fencing will only take place once topsoil reinstatement has been completed. The temporary fencing will have safe crossing points at various locations as required.

Pre-Construction Drainage

3.6.8 The contractor would carry out the installation of site header drains and divert existing land drains prior to construction of the pipeline. Reinstatement of land drains once the pipeline construction has been completed forms part of land reinstatement as described below.

Topsoil Removal and Storage

3.6.9 Topsoil would be removed to the required depth. This would vary depending on site location. The removed topsoil would be stored to one side of the working width (see Section 3.11).

3.6.10 Details of methodologies to protect the integrity of the soils are summarised in Chapter 4 and the CoCP.

Pipe Storage

3.6.11 Pipes would be transported directly to the pipe storage areas within the various temporary construction compounds by lorry. From each pipe storage area, the pipes would then be transported along the working area and spaced accordingly.

Welding

3.6.12 Lengths of pipe would be welded together to form the pipeline. Welds will be subjected to non-destructive testing such as radiography or ultrasound.

Dewatering

3.6.13 In some locations groundwater levels may be too high to allow construction of the pipeline. In such locations dewatering may be required to aid pipeline construction.

3.6.14 The development of embedded and good practice mitigation measures to reduce potential impacts from dewatering discharges are outlined within Chapter 4 and the the outline CoCP (Appendix 1).

Trench Excavation

3.6.15 Open cut trenching techniques would be used for the majority of the route (see Section 3.11). The trench would be excavated, with temporary storage of subsoil on the opposite side of the working width to previously removed topsoil. If required bedding material would then be placed within the excavation and, following pipe installation, suitable surround materials would be placed as required. The trench would then be backfilled with suitable subsoil from the temporary storage and compacted above the installed pipe.

Pipeline Hydrostatic Testing

3.6.16 Pipeline sections will be subjected to hydrostatic testing to check the pipeline's integrity prior to commissioning. Water for hydrotesting will be sourced from a local suitable supply. Used test water will be discharged in a controlled manner.

Land Reinstatement

3.6.17 Land drains would be reinstated to maintain the integrity of pre-existing land drainage patterns. The working width would then be cleared, any sub-soil reinstated and loosened, and topsoil re-laid, seeded and cultivated as required. Any affected hedgerow sections and trees would be replanted and any other affected boundaries

reinstated as appropriate. Land would be returned to its original use, which is typically agriculture. Temporary fencing would remain in place until grazing land has sufficiently recovered to withstand grazing pressure.

Crossings

3.6.18 The crossings of trunk roads, motorways and railways will be crossed using trenchless techniques, such as auger bore, horizontal directional drilling (HDD) or micro-tunnelling (please see Section 3.11). A number of other roads could also be crossed using trenchless techniques, although the details have yet to be confirmed. These technologies can install a pipeline underneath major obstructions without disturbance or interruption to the feature being crossed.

3.6.19 Other roads would typically be open cut. Roads being crossed using open cut techniques would need to be partially or completely closed during construction of the crossing, with appropriate traffic management measures and temporary diversions being put in place for the duration of the works. Partial and complete road closures would be kept as short as possible, typically a maximum of 2-3 days for complete road closures, to reduce effects on local traffic and communities.

3.6.20 Crossings of watercourses including rivers, streams and ditches would typically be open cut, although crossings of major watercourses such as the Basingstoke Canal and River Thames would require trenchless techniques.

3.6.21 As part of the design development process, individual crossing locations would be assessed as being appropriate for open cut or trenchless crossings. This process would carry on throughout the EIA process and be presented in the ES to be submitted with the application for development consent.

Temporary Drainage Works

3.6.22 Where necessary, additional drainage for site yards, mobilisation areas and accesses would be installed in accordance with the design.

Consents, Permits, Licences and Authorisations for Construction

3.6.23 The DCO will contain requirements for certain pre-construction approvals and the project will consult as necessary to obtain such approvals. Where the appropriate authorisation is not provided under the DCO, the project will seek such further consents, permits, licenses and authorisations as may be required.

Route Survey, Setting Out and Record of Condition

3.6.24 Photographic records would be compiled during route survey and setting out of the works. Detailed records of the condition of the roads in the vicinity of the route would also be taken. Photographic records would also be taken of features that are likely to be affected by the Project.

Pipeline Construction in Urban Areas

3.6.25 The construction of the replacement pipeline in built up urban areas would follow a similar sequence to that for rural areas, although as a result of the increased number of constraints, the construction process would be more complex. The key differences to the approach for work in urban areas as compared to work in rural areas include:

- Increased need for implementation of road closures, diversions and traffic management measures.

- More constrained working widths associated with increased obstructions and other constraints.
- A greater need for the breaking out of road and other hard surfaces when excavating the pipeline trench.
- Increased likelihood that material excavated from the pipeline trench will require off-site disposal, i.e. material excavated when laying pipelines in or across roads cannot be re-used, with suitable imported material having to be used for backfilling of the trench.
- Shorter pipe lengths resulting in more pipe welds.
- Increased need for reinstatement of road surfaces, footpaths and landscaped areas.

3.7 Above Ground Infrastructure (AGI) Construction

3.7.1 The construction of the new pigging station at Boorley Green and valves along the route of the replacement pipeline would generally follow a sequence of activities similar to that outlined below:

- Pre-construction activities (e.g. site access and the formation of compound and material stores).
- Erection of secure fencing for construction works.
- Construction of drainage measures (where required).
- Earthworks to establish foundation levels.
- Formation of plant foundation bases, chambers and above ground structures.
- Construction of pipework and equipment and associated infrastructure.
- Perimeter reinstatement landscape works and removal of temporary infrastructure.

3.8 Construction Schedule

3.8.1 The construction schedules for each of the various sections of the replacement pipeline described in Table 3.1 will depend on their differing characteristics, and at this stage of design development only indicative information is available. This will be progressed during the EIA process.

3.8.2 The final schedule would be programmed where possible to avoid times of particular environmental sensitivity such as animal breeding and hibernation seasons, large community events and school/religious building usage.

3.8.3 Construction of the Project is expected to last from early 2021 until the end of 2022. The pipeline will require two main types of construction methodology due to the nature of the land that it crosses. For ease of explanation, this section has been divided into two parts describing works within both typical rural and urban areas. All of the timings within this section are illustrative for the purposes of scoping.

3.8.4 The Scoping Report has been based on some key assumptions for pipeline construction over differing terrain split into rural and urban types. These assumptions are presented in Table 3.2. For the purposes of Table 3.2, Sections A-C are considered to be 'Rural' and Sections D-H are considered to be 'Urban'.

Table 3.2 Rural and urban working assumptions

Assumption	Rural	Urban
Maximum concurrent work fronts per section	8	6
Pipe length laid per week	450m	90m
Excavated spoil off-site	Limited	Yes
Standard construction working	Monday – Saturday 0700 to 1900	
Typical pipe lengths	12m	3-6m
Road closures for open cut pipeline crossings of carriageways	2-3 days maximum, Class B roads and lower.	
Traffic management	Traffic signals to be provided where pipe is laid along or adjacent to carriageways. Mostly two-way working.	
Staff per work front	10 staff	10 staff

Rural Construction

3.8.5 Sections A to C mainly travel through rural areas. The main method of construction in this type of landscape would be open cut trenching (please see Section 3.11 for methodologies).

3.8.6 The average rate of pipeline laying for this type of construction is 450m per week for trench excavation, pipe installation laying and backfilling of trenches. Prior to this, however, the contractor would fence the site, strip topsoil and install construction drainage. In addition, construction compounds, pipe stringing areas and any haul routes would be prepared prior to the start of the construction of a Section. These would generally be in use for the duration of the works within a Section.

3.8.7 At this rate of work, a 1km stretch of pipeline would be installed and covered in just over two weeks. The fencing, top soil stripping and drainage would be completed prior to this time and could take up to three to four weeks for a 1km stretch. Works would not necessarily commence directly after topsoil had been stripped.

3.8.8 Haul routes and compounds may be required as a means of access until the replacement pipeline has been commissioned and the reinstatement is complete. Land on which a compound has been constructed would be reinstated to its original use. Replacement of top soil and re-planting of vegetation would take place at a seasonally suitable time after the works had been completed (please refer to Chapter 10 Landscape and Visual).

3.8.9 Within a Section, there would be a number of work fronts. A work front is a specific area or location where a crew generally comprising of up to 10 construction workers are carrying out a particular aspect of the main pipeline construction activities, including topsoil stripping, trench excavation, pipe installation and backfilling of trenches. There may be a number of work fronts operating simultaneously. It is expected that in rural areas there would be up to a maximum of eight work fronts. Each work front would typically continue in the same direction, south to north, but starting from a different point. For the purposes of undertaking the scoping assessment the assumption has been made that all work fronts could be working at the same time but at minimum separation distances to reduce noise disruption to local communities (please refer to Chapter 13 People and Communities and the accompanying Appendix 8.3 Noise and Vibration Technical Note).

Urban Construction

3.8.10 The pipeline within Sections D to H, will pass through mainly but not wholly within urban environments. The main method of construction in urban areas would also be open cut trenching. However, such environments require a different methodology of working with no requirement for fencing or topsoil stripping but additional activities such as setting up traffic management and utility diversions.

3.8.11 The average rate of pipeline laying for this type of construction is 90m per week to include all activities. At this rate of work, a 1km stretch of pipeline would be installed and covered in 11 weeks. However, as some lengths of road may be longer than this, disruption on a single road could last longer than the 11 weeks.

3.8.12 As for rural Sections, there would be a number of work fronts; up to a maximum number of six working simultaneously. For the purposes of undertaking the scoping assessment the assumption has been made that all work fronts could be working at the same time but at minimum separation distances to reduce noise disruption to local communities (please refer to Chapter 13 People and Communities and the accompanying Appendix 8.3 Noise and Vibration Technical Note).

Trenchless Locations

3.8.13 There are a number of alternative methodologies for installing the pipeline where open cut trenching would not be an option such as crossing a railway or trunk road. In these cases, a trenchless technology would be employed (please see Section 3.11 methodologies). The majority of the current expected locations are included within the embedded mitigation Table 4.14 within Chapter 4 Design Evolution.

3.8.14 The duration of such construction techniques varies according to the length of the pipe being installed and the technique used. For example, for HDD, the construction of a 100m long crossing would take around 4-5 weeks, with a further 2 weeks required per 100m increase in the length of the crossing. Based on this, for each of the specific locations of major trenchless crossings, the works to install the pipeline would likely take around 4 to 8 weeks. This is based on an assumption that the works to install trenchless crossings will not be unduly restricted with regards to working hours. Certain activities will require continual 24 hours a day working, for example the pipe pulling phase for a HDD. If working hours for trenchless crossings are restricted, then the installation would take longer.

Installation of Associated Infrastructure

3.8.15 The construction of the pigging station and the installation of cathodic protection systems, valves and marker posts would take place during the construction stage of the pipeline. The pigging station near to Boorley Green would be constructed during 2021 and would take approximately five to six weeks to build.

3.8.16 Cathodic protection systems and valves would be installed whilst the pipeline is being laid as they are an integral part of the pipeline. This would be minimal works as the existing ground beds would be used wherever possible.

3.8.17 Marker posts would be erected towards the end of the works. The erection of marker posts is not dependent upon or linked to the vegetation reinstatement phase.

3.9 Operation and Maintenance

3.9.1 Once the pipeline is operational, Esso would carry out a programme of inspection and maintenance in accordance with good practice and regulatory requirements. This would typically include:

- Inspections of valves, typically on a monthly basis.
- Pipeline route walkover inspections, typically completed in the winter months every two years.
- Pipeline route helicopter inspections, typically every other week.
- Pipeline route patrols by vehicle/on foot in discrete areas, typically on a weekly basis.
- CP transformer rectifier cabinet inspections, typically on a monthly basis.
- Testing of CP system (measurement of current at CP test points), typically on a biannual basis.
- A programme of cleaning and inspection using PIGs.

3.9.2 Where issues are found, these would be corrected by appropriate remedial works.

3.10 Decommissioning

3.10.1 As stated previously in Section 3.1, the decommissioning of the existing pipeline does not form part of this Project.

3.10.2 When the operator of the replacement pipeline determines that it will permanently cease pipeline operations, it will consider and implement an appropriate decommissioning strategy taking account of good industry practice, its obligations to land owners under the relevant pipeline deeds and all relevant statutory requirements.

3.10.3 At the time that decommissioning would take place, the regulatory framework, good working practices and the future baseline could have altered. It is not possible to assess the probable future effects at the present time. Decommissioning has therefore been scoped out of this assessment, and each of the topic chapters include a brief statement to that effect.

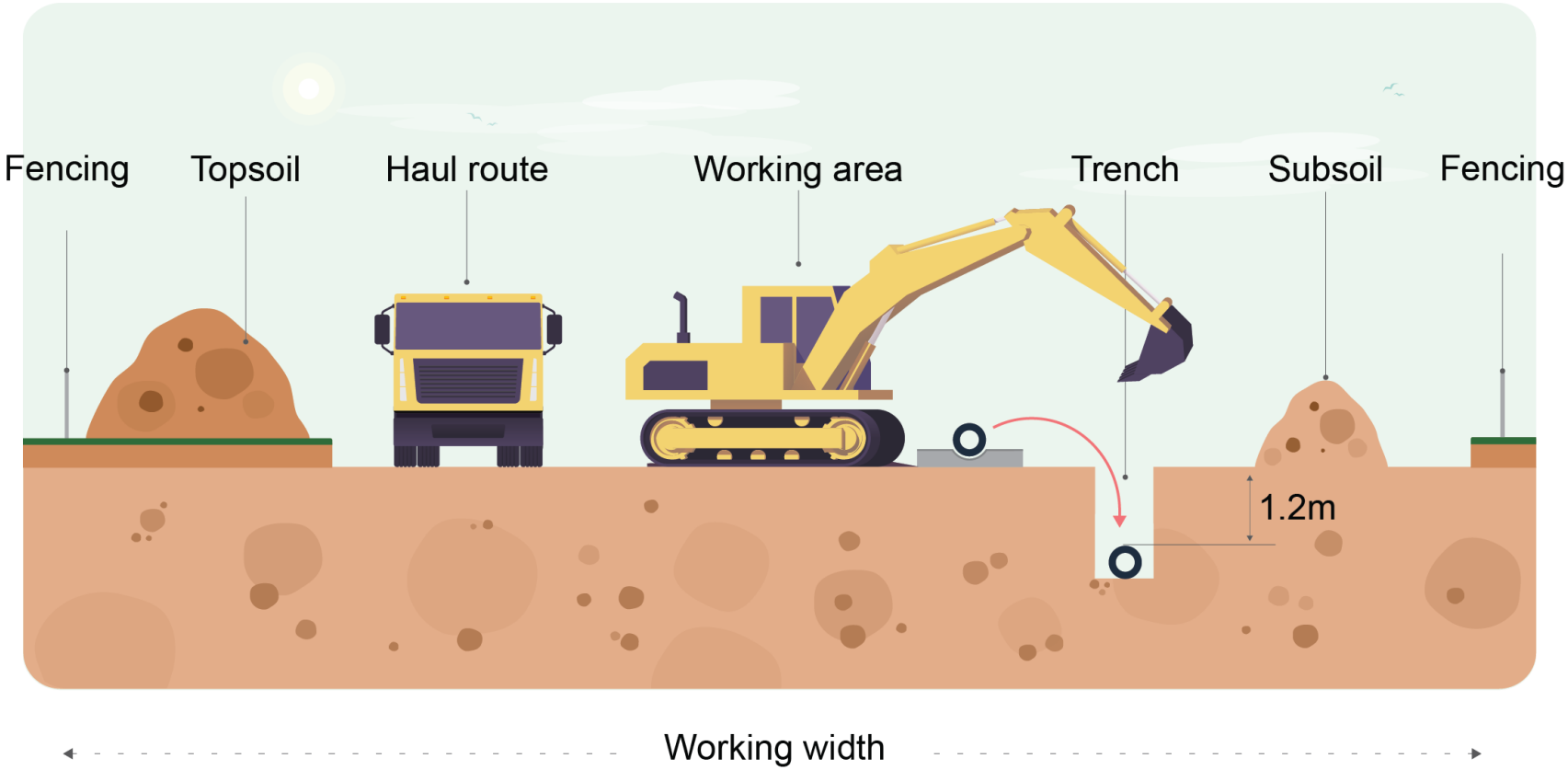
3.11 Summary of Construction Techniques

3.11.1 The various open cut and trenchless techniques that would typically be used to construct the pipeline are summarised briefly in this section. All figures in this section are for illustrative purposes only and are not to scale.

Open Cut Trenching Methods

3.11.2 Open cut trenching is the most commonly used pipeline construction technique on this Project. A trench would be dug by excavator as illustrated in Figure 3.11. The pipe would be a minimum of 1.2m below the ground surface in open cut sections.

Figure 3.11 Open cut trenching and typical working width



3.11.3 Where the full working width is not available, topsoil and subsoil may have to be stored in a location away from the working area.

3.11.4 In some areas obstacles are present on both sides of the works creating a more constrained working width. At such locations, the pipeline may have to be constructed using a 'dead-end' working technique. This is where short lengths of trench are excavated, a section of pipeline installed and the trench backfilled before the work moves forward to the next section.

3.11.5 When crossing through boundaries between fields where these include hedgerows, tress or watercourses, a commitment has been made to only utilise a 10m width. In such locations, the working width will be constrained and alternative layouts considered.

Open Cut Trench Watercourse Crossings

3.11.6 A number of watercourses would be crossed using open cut techniques. The typical approach for such open cut trench crossings of watercourses is described here.

3.11.7 A flume pipe/s would be installed into the bed of the watercourse, sized to allow the flow of the watercourse through it during the works. The watercourse will be dammed at each end of the flume to form a dry area in between.

3.11.8 A vehicle haul road will be constructed over one half of the flume. A trench will then be excavated under the other half of the flume and the pipe installed at least 1.2m below the hard bed. Once the watercourse bed and banks are reinstated and all works complete, the flume will be removed allowing the watercourse to flow naturally.

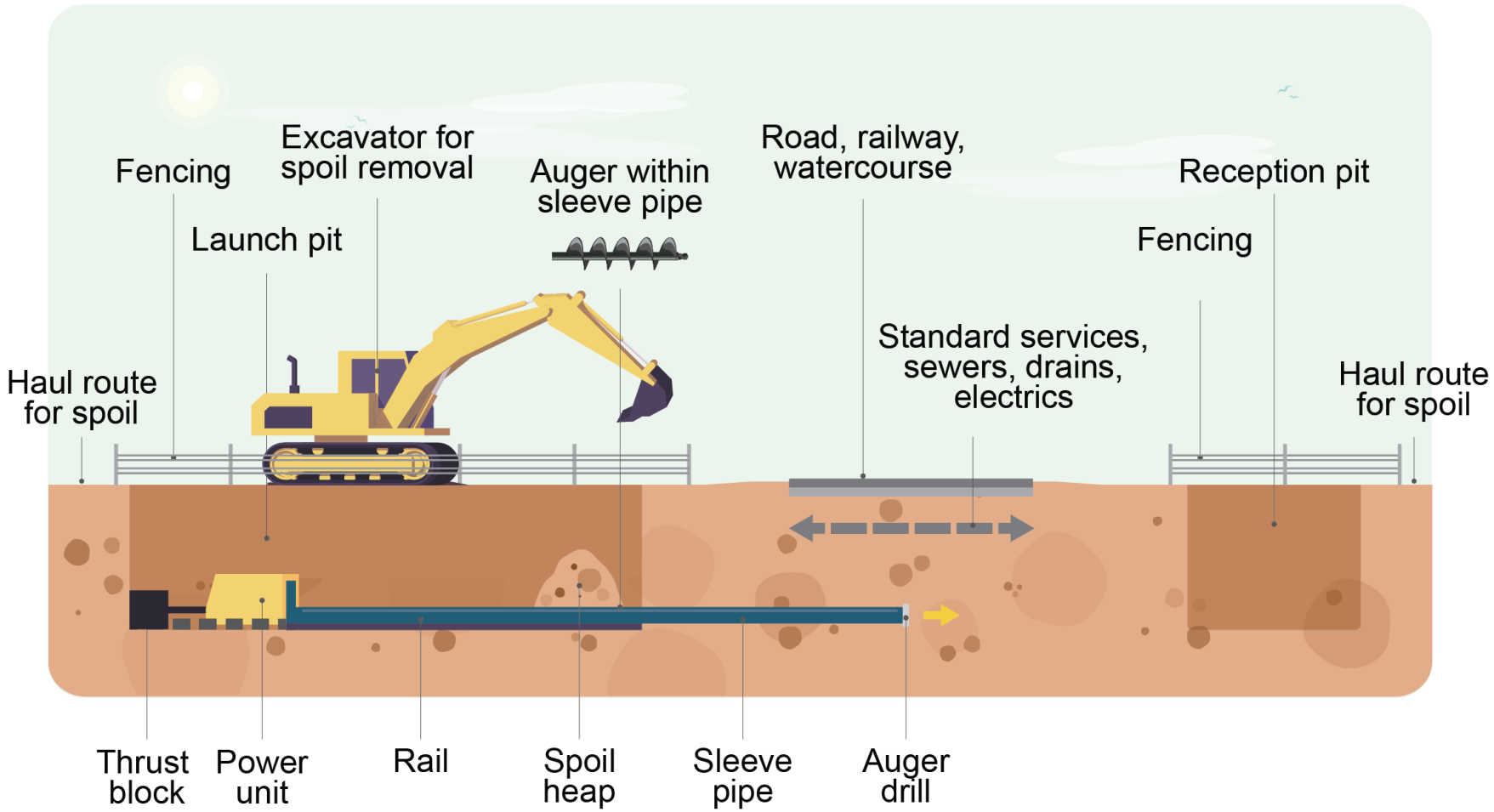
Trenchless Construction

Auger Bore Technique

3.11.9 Auger bore is a trenchless method used over relatively short distances and usually at shallow depths. Shallow launch and reception shafts would be dug on either side of the obstacle. An auger (an Archimedes screw or helix on a shaft) would bore horizontally to install a sleeve pipe beneath the obstacle and connect each pit.

3.11.10 Figure 3.12 illustrates a typical auger bore technique.

Figure 3.12 Auger bore technique



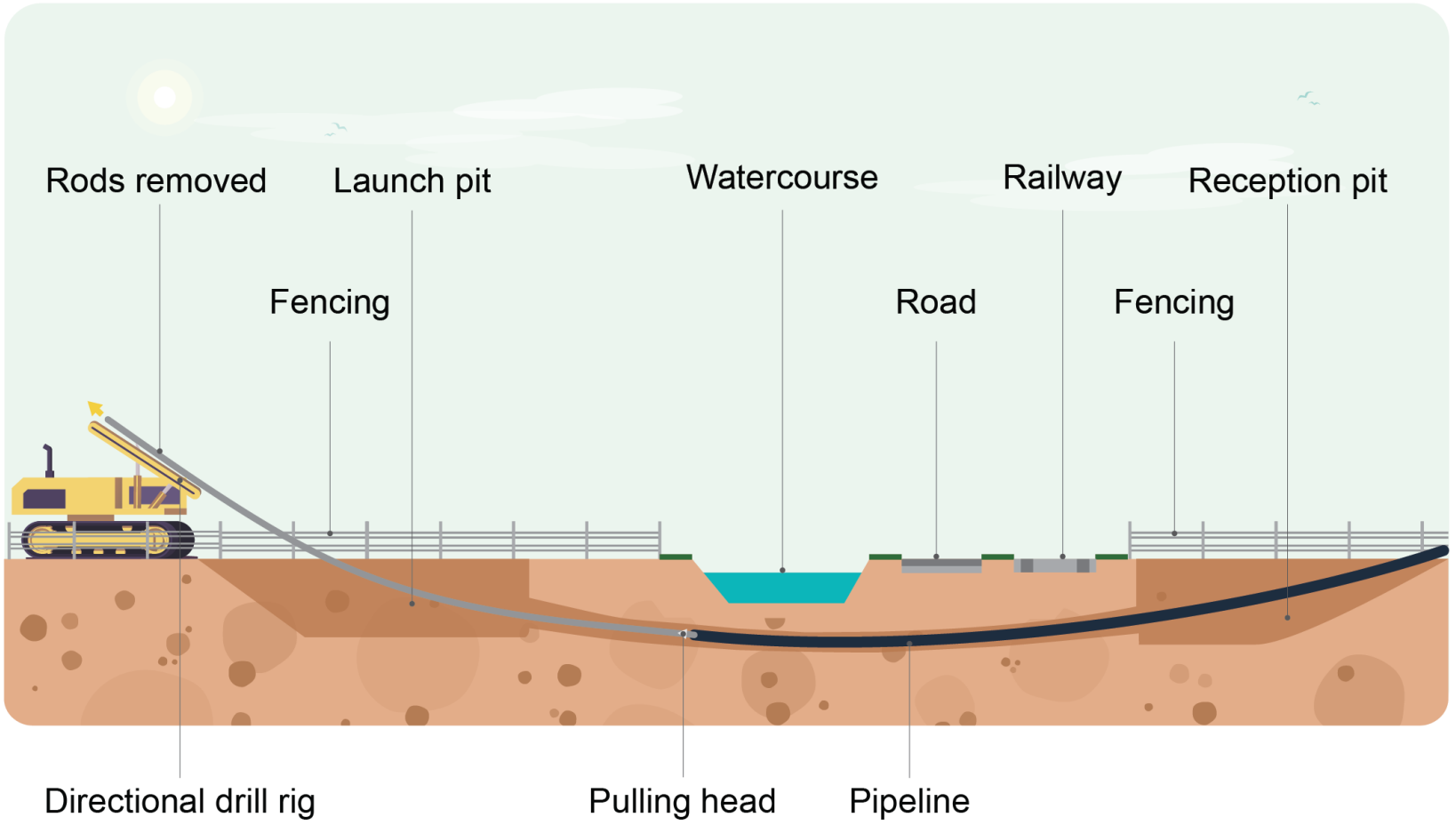
Horizontal Directional Drilling (HDD) Technique

3.11.11 HDD is a trenchless method of pipeline construction. A series of flexible rods would be driven through the earth from a ‘launch pit’ to form a small tunnel. A mud slurry would be used as a hydraulic fluid and coolant.

3.11.12 As the rods progress through the earth, extra rods would be added until the drill head emerges at the ‘reception pit’. At the reception pit, the drill head would be removed and a larger one attached. This would continue to enlarge the tunnel until it is a size greater than the pipe.

3.11.13 A length of pipeline would be laid out and welded (pipe stringing) beyond the crossing. The welded pipe will then be pulled back through the tunnel completing the drilling operation (see Figure 3.13).

Figure 3.13 Horizontal directional drilling (HDD) technique

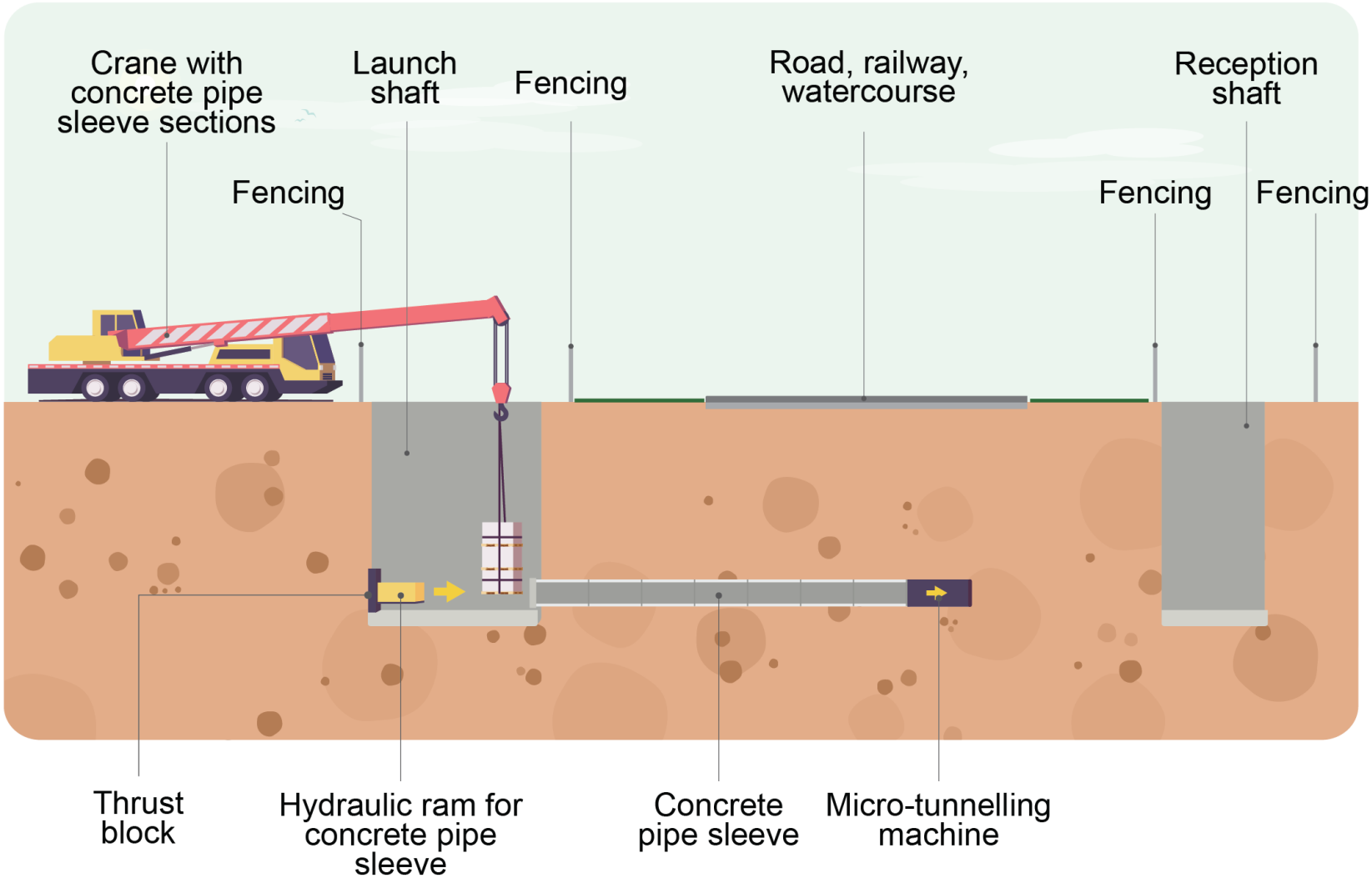


Micro-Tunnelling Technique

3.11.14 Micro-tunnelling is another trenchless method of pipeline construction as shown on Figure 3.14. Launch and reception shafts would be sunk on either side of the obstacle. A micro-tunnelling machine would then be used to bore a tunnel to connect each shaft.

3.11.15 As the micro-tunnelling machine progresses through the ground, it would be followed by concrete pipe sleeve sections that form the tunnel. These sections would be lowered into the launch shaft and pushed into place using hydraulic rams. With the tunnel constructed, the pipeline would be installed within it.

Figure 3.14 Micro-tunnelling technique



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Chapter 4
Design Evolution

Scoping Report Volume 1

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4. Design Evolution

4.1 Introduction

4.1.1 This Chapter provides a summary of the main alternatives considered, the development of the scheme, and the key embedded and good practice mitigation relied upon for the scoping process.

4.2 Relevant Legislation and National Policy Statements

Legislation

4.2.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the Infrastructure EIA Regulations) require that an Environmental Statement (ES) should include a *"…description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment"*.

Policy

4.2.2 NPS EN-1 (para 4.4.2) also requires that *"environmental, social and economic effects and including, where relevant, technical and commercial feasibility"*, are also taken into account.

4.2.3 NPS EN-1 advises that each application for development consent for pipelines should be assessed with regards to the significant need for this infrastructure, and that the consideration of alternatives in order to comply with policy requirements should be carried out in a proportionate manner.

4.2.4 NPSs EN-1 (in sections 4.4, 5.3, 5.7 and 5.9) and EN-4 (at paragraphs 2.21.3, 2.23.3 and 2.23.8) include a policy requirement, applicable in some circumstances, to consider alternatives, in order to avoid significant harm to biodiversity and geological conservation interests, and in relation to nationally important designated landscapes, and flood risks. EN-1 also acknowledges (in para 4.42) that the Conservation of Habitats and Species Regulations may also require consideration of alternatives in relation to European designated sites in some circumstances.

4.2.5 NPS EN-4 (at paragraphs 2.19.7-10 and 2.20-23) indicates that numerous factors influencing site/route selection need to be considered by applicants for gas and oil pipeline NSIPs, including:

- noise and vibration;
- biodiversity, landscape and visual impacts;
- water quality and resources; and
- soil and geology.

4.2.6 Further, paragraphs 2.19.8 and 2.19.10 of NPS EN-4 state under the heading 'Factors influencing site selection by applicant':

"2.19.8 When designing the route of new pipelines applicants should research relevant constraints including proximity of existing and planned residential properties, schools and hospitals, railway crossings, major road crossings, below surface usage and proximity to environmentally sensitive areas, main river and watercourse crossings. These can be undertaken by means of desk top studies in the first instance, followed up by consulting the appropriate authority, operator, or conservation body if necessary."

"2.19.10 When choosing a pipeline route, applicants should seek to avoid or minimise adverse effects from usage below the surface. Where it is not considered practicable to select a route that avoids below surface usage, applicants should demonstrate in the Environmental Statement (ES) that mitigating measures will be put in place to avoid adverse effects both on other below ground works and on the

pipeline. Mitigating measures may include: protection or diversion of underground services; gas detection near landfill sites; horizontal direct drilling (HDD) techniques and rerouting. Contaminated material may need to be removed and disposed of."

4.2.7 The methodology developed for the appraisal process (see Section 4.4) incorporates and considers all of the factors influencing site/route selection indicated by NPS EN-1 and NPS EN-4.

4.3 Consideration of Alternatives

4.3.1 The ES for the Project will provide a full description of alternatives considered for the replacement pipeline, including the 'do nothing' scenario. This section provides a summary of the main alternatives considered and the decisions made to date. They take into account environmental, social, economic, commercial aspects and technical feasibility.

Do-nothing Scenario

4.3.2 The justification, and need, for the Project is described in Section 1.3 (see Chapter 1).

4.3.3 A 'do nothing' scenario would not take forward any development proposals associated with the Project. To be a viable alternative to the Project, the continued operation of the existing pipeline would be required for another 60 years (the intended design life of the replacement pipeline). This has been rejected as unfeasible as the need for increased repairs will necessitate the shutdown of the pipeline. In effect the do nothing scenario equates to the eventual closure of the existing pipeline and the consequent cessation of this supply of aviation fuel. The main issues of a 'do nothing' scenario are:

- An increasing need for inspections, excavations and repairs to the existing pipeline, which was built between 1969 and 1972.
- Increased risk of interruption and failure to supply aviation fuels from Fawley Refinery near Southampton to airports in South East England.
- Loss of potential economic development opportunity for South and South East England.

Alternatives to the Project

4.3.4 The existing pipeline is working adequately, but the need for inspections and maintenance is increasing. Due to the lack of viable alternative technologies and systems, the use of road tankers or in-line renewal of the existing pipeline are considered to be the main alternatives to the replacement pipeline. These have been rejected.

4.3.5 At a preliminary stage the Project considered alternative ways of transporting fuel, particularly by road. The Project would keep around 100 road tankers off the road every day (an estimate based on the volume of aviation fuel transferred from the Fawley Refinery to the West London Terminal storage facility via pipeline in 2015). Transporting such large quantities of fuel by road on a daily basis would be unreliable, uneconomic and have long term environmental and social consequences. This is compared to the mainly short term construction-related effects associated with the installation of the replacement pipeline. The alternative option of transporting aviation fuel by road has therefore been rejected by the Project.

4.3.6 Another alternative considered by the Project is the in-line renewal of the existing pipeline. This process would involve dividing the pipeline replacement Project into a series of in-situ replacement of sections of the existing pipeline over time. This option was rejected as unfeasible due to the requirement to maintain operation of the existing pipeline to supply to the West London Terminal storage facility. This requirement would severely limit the amount of time the pipeline could be shut down for engineering work, would not allow for efficient working and would mean that in order to avoid significant disruption, only relatively small sections of pipeline could be renewed at any one time. The renewal of the entire pipeline could not, therefore, be achieved within the necessary time frame. In addition, this alternative would offer no environmental benefit over the proposed replacement pipeline project.

4.3.7 For the above reasons, Esso has decided there is no feasible alternative other than replacing the 90km (56 miles) between Boorley Green in Hampshire and its West London Terminal storage facility in Hounslow with a new pipeline. The remainder of this chapter therefore describes the development of proposals for a replacement pipeline, and the alternatives considered within this process.

4.4 Development of the Preferred Option

Overview

4.4.1 This section provides an overview of the approach taken for the development of the route on which this scoping exercise is based. The approach included two distinct stages, namely:

- Stage 1: Selection of the consultation corridors and preferred corridor;
- Stage 2: Development of the route.

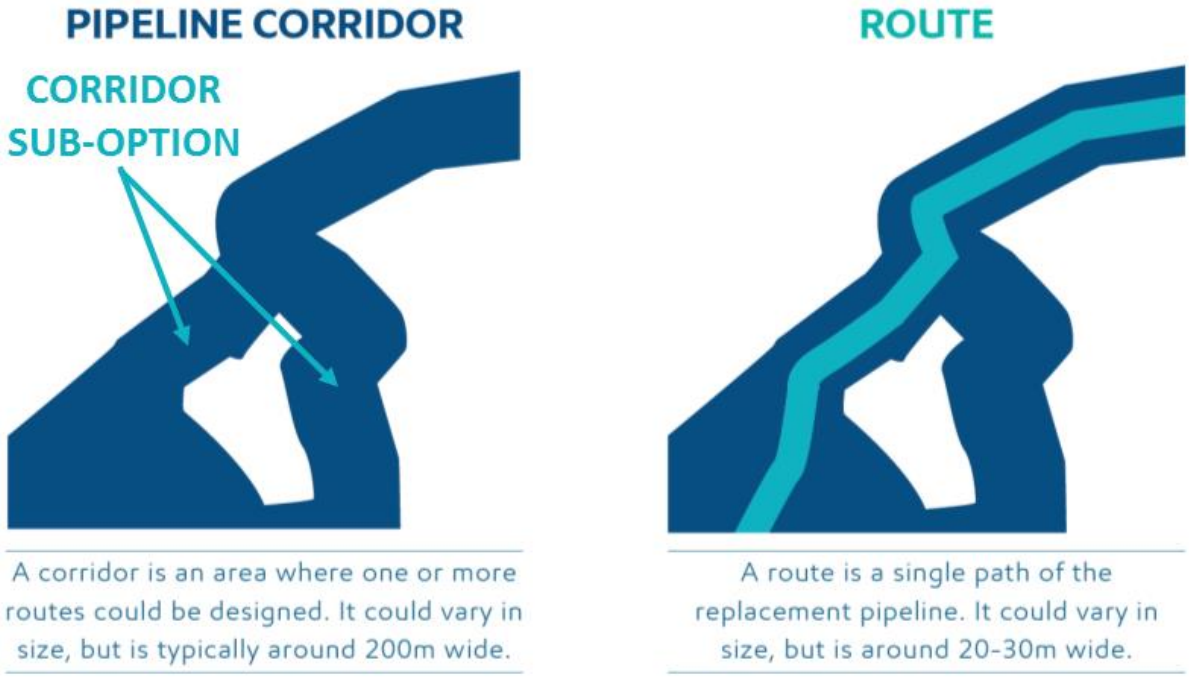
Background

4.4.2 A pipeline corridor is an area which would allow the design of one or more route options. A pipeline corridor may:

- vary in size, but is typically around 200m wide;
- be locally widened or contracted to avoid constraints or mitigate the impact of the Project;
- include multiple 'sub-options', minor diversions that have yet to be fully resolved by the Project team.

4.4.3 A route is a single path for the replacement pipeline. During construction this is typically a 30m wide working width. This working width, together with other temporary construction areas and compounds adjacent to or near the working width, is required to ensure sufficient space is available to allow the pipeline to be installed efficiently and safely whilst reducing effects on the surrounding environment. This wider area is also known as the Order Limits. Figure 4.1 provides a schematic demonstrating the relationship between a pipeline corridor and a route.

Figure 4.1 Relationship between pipeline corridor and route



Stage 1: Selection of the corridors

4.4.4 The corridor selection process included evaluation of multiple corridor options to identify corridors, incorporating sub-options where required, that provided the best opportunity against all the known constraints to meet the Project Objectives and Guiding Principles. These can be found within Section 4.5 which describes the approach that was taken to select the preferred corridors.

4.4.5 During the initial stages of the Project several corridors were developed as a long list. The pipeline corridors under consideration continued to change and evolve as new information was gathered – creating a short list. At this stage the Project evaluated multiple pipeline corridors and identified a favoured corridor to the north and a favoured corridor to the south of Alton Pumping Station from the short list. Technical work was focussed on these favoured corridors. Following the non statutory corridor consultation, the favoured corridors were selected as the preferred corridor.

4.4.6 Since announcing the selection of the preferred corridor, Esso has continued to develop the route that follows the preferred corridor, and has released an initial working route via the Project's website. Due to the length of time it takes to prepare the scoping materials, this report was based on an earlier draft of the route within the preferred corridor.

Stage 2: Development of the route

4.4.7 Following selection of the preferred corridor, technical work was taken forward for further phases of design development, providing a route and outline design information on which the scoping exercise has been based.

4.4.8 This included creation of outline designs for permanent infrastructure, including:

- The pipeline and its route;
- The Above Ground Installations (AGIs) including:
  - Boorley Green pigging station compound;
  - In-line valve enclosures; and
  - Cathodic Protection (CP) cabinets.
- Buried infrastructure, including:
  - Valves and associated chambers; and
  - Electrical and control cabling.

4.4.9 In addition, outline designs were also created for temporary infrastructure required for the installation of the pipeline, including:

- Construction and pipe storage compounds;
- Additional working areas; and
- Access to the working areas.

4.4.10 Section 4.6 describes the design development process.

4.5 Favoured Corridor Selection

Pipeline Corridor Selection Methodology Overview

4.5.1 A standardised approach was adopted for the various steps leading to the selection of the favoured corridor. In outline, this comprised:

- Consideration of corridors against project objectives;
- Comparative appraisal based on guiding principles;
- Review of collated data on constraints and other information relating to guiding principles, and the development of 'criteria', to inform the above; and
- A multi-disciplinary workshop to discuss overall, relative performance of corridors.

4.5.2 This was an iterative process applied to:

- Corridor creation to produce a long list of multiple corridor options;
- Sifting of the long list to create a short list of a reduced number of corridor options (the term sifting is used to describe the process of comparing long list options to create the short list); and
- Appraisal of short listed options to identify the favoured corridors pipeline options included, with other shortlisted corridors, in the consultation (non-statutory) in March/April 2018 (see Chapter 5 for details).

4.5.3 Following the close of the consultation on 30 April 2018, an independent consultation expert collated all of the consultation responses, which were then analysed. Following further review of technical data by the multi-disciplinary project team and in-depth analysis of the consultation, the selection of the preferred pipeline corridor was announced on 30 May 2018.

4.5.4 The following sections provide more information on the above process.

Project Objectives

4.5.5 The Project Objectives were developed as fundamental requirements for delivering a successful project. They are:

- To replace the pipeline from Boorley Green to the West London Terminal storage facility in Hounslow, via Alton in Hampshire, to connect to existing pipeline infrastructure;
- To meet all the relevant planning requirements;
- To maintain fuel supply during replacement; and
- To develop and install a safe, buildable, operational and economically feasible pipeline.

Guiding Principles

4.5.6 By definition, a feasible corridor must meet the Project Objectives. To ensure this was the case, a set of Guiding Principles was prepared to support the selection process.

4.5.7 Any individual corridor was considered as having an advantage over other feasible alternatives if it:

- will benefit from existing equipment (infrastructure) and relationships with landowners;
- is likely to have better environmental outcomes versus the other options considered, especially relating to internationally and nationally important features along the final route;
- will provide social and economic outcomes of greater benefit compared to the other corridors;
- will pass through less complex or built-up areas (where possible);
- will achieve compliance with National Policy Statements; and
- can be installed in a timely and realistic manner at reasonable cost.

Data Collection

4.5.8 During the course of the corridor creation, long list sifting and short list appraisal stages, available data were progressively collected relating to:

- Esso's existing pipeline assets and facilities;
- 'Linesearch before U dig' data (including information relating to BP, Shell, National Grid, Scottish Power, Veolia and INEOS assets);
- Strategic utility assets;
- Ground conditions;
- Spatial existing environmental conditions, designations and constraints (from available public open access datasets);
- Mapping (OS and web-based);
- Local Authority records;
- Committed development records (planning permissions and development plan policy allocations);
- Authorised and historic landfill sites;
- Unexploded Ordnance (UXO);
- Common and Open Land;
- Land referencing; and
- Schools and hospitals.

4.5.9 Collected data were used to:

- Identify corridor constraints, e.g. to identify the locations of crossings and significant obstacles;
- Identify viable construction techniques for various locations; and
- Confirm the existence of a feasible path within each corridor.

4.5.10 Based on the collected data, further information gathering and assessment was undertaken, including:

- Targeted site visits, in particular at sensitive or difficult locations;
- Preliminary desktop assessment of ground conditions;
- Identification of crossings of major motorways, railway lines, rivers, and areas of high environmental value such as Ancient Woodland and wetlands. These have an important influence on the path of potential pipeline routes, and were therefore considered during corridor creation;

- Identification of environmental and socio-economic constraints, including: Special Protection Areas (SPA), Special Areas of Conservation (SAC), Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR); Ancient Woodland; National Parks and Areas of Outstanding Natural Beauty; Scheduled Monuments; Registered Parks and Gardens, Battlefields; Groundwater Special Protection Zones 1 and 2; land used by the community including recreational areas; authorised and historic landfills; proximity of populated areas, residential properties, schools, hospitals and cemeteries; and potential for disruption to communities;
- Use of local authority planning portals. All adopted or emerging Local Plans were reviewed to identify development allocations and local planning policy constraints for the long list options. Pipeline corridors were also assessed against criteria including: the NPSs and related guidance (high level review); land use designations/allocations including proposed development; open space; Green Belt; Crown Land; Common Land; allotments; and National Trust land.

4.5.11 The collection of data relating to pipeline corridor constraints is a progressive process, and therefore the various stages of the corridor selection process were informed by the data available at the particular point in time at which each stage was undertaken. The potential for new data becoming available that could have implications for corridor options was regularly reviewed, and any implications were fed back into the decision-making process.

Corridor Creation to Determine the Long List

4.5.12 The standardised methodology (outlined above) was used to create multiple corridor options. This followed the principles outlined below.

4.5.13 The overarching principle of pipeline corridor creation was that any corridor would have at least one defined path that appeared to be technically feasible and was considered likely to meet the Project Objectives and Guiding Principles.

4.5.14 Three key geographical constraints informed the creation of corridor options for the long list as follows:

- The existing aviation fuel pipeline had already been renewed between Hamble and Boorley Green in Hampshire. Therefore, the pipeline must begin at Boorley Green;
- The replacement pipeline must be routed via the existing pumping station facility at Alton to connect to existing infrastructure;
- The replacement pipeline must terminate at the West London Terminal storage facility.

4.5.15 These constraints split the replacement pipeline into two geographic areas, south of Alton and north of Alton, and on this basis it was decided that creation of long list corridor options would be progressed separately for the north and south areas.

4.5.16 To produce the long list of corridor options, a set of corridor creation criteria was developed covering the following topic areas:

- Engineering/constructability, including:
  - Major infrastructure, such as motorways, roads and railways;

  - Water logged areas;
  - Steep slopes;
  - Historic extraction/landfill areas;
  - Ground stability; and
  - Major urban areas.
- Environmental and social, including:
  - Designated sites including SPAs, SACs, SSSIs and NNRs;
  - Designated Ancient Woodland;
  - National Parks and Areas of Outstanding Natural Beauty;
  - Scheduled Monuments, Listed Buildings and Registered Parks and Gardens;
  - Groundwater Special Protection Zones 1 and 2;
  - Land used by the community, including recreational areas;
  - Authorised and historic landfills;
  - Proximity of populated areas, residential properties, schools, hospitals and cemeteries; and
  - Potential for disruption to communities.
- Planning, including:
  - Common Land;
  - Crown Land;
  - National Trust Land;
  - MoD Land; and
  - Allocated Land and Committed Development.
- Cost/schedule, including:
  - Corridor length; and
  - Economic viability.

4.5.17 It is important to note that criteria were aimed at avoiding a wide variety of potential constraints, however, it was recognised that avoidance of all constraints along a route whilst preferable would not be possible due to the length of the entire route.

4.5.18 The use of these criteria helped to create multiple corridors for the north and south areas. The criteria also assisted in identifying the need for specialised construction techniques.

4.5.19 For the purposes of determining the alignment of a pipeline corridor, the standard working width was assumed to be typically 30m wide to ensure flexibility regarding detailed routing and the working direction for pipeline installation. Where specific constraints on working width existed, for example for street works in urban areas, narrower corridor widths were assumed.

4.5.20 ‘Open cut’ trenching techniques (see Chapter 3, Section 3.11) can be accommodated within an approximate standard 30m working width and within reduced working widths where pinch points exist. However, the use of specialist trenchless techniques such as auger bore, horizontal directional drilling (HDD) and micro-tunnelling (see Chapter 3, Section 3.11) require additional working space. Therefore, the corridor widths where such techniques are expected to be used were extended. Remaining routeing uncertainty due to specific constraints in certain locations was also addressed. This was achieved by inclusion of a number of ‘bulges’ in the corridors

4.5.21 The long list of corridor options, the reasoning behind their creation and general

descriptions are provided in Table 4.1. The alignments of each of the long list corridor options are also illustrated on Figure 4.2 (South Options) and Figure 4.3 (North Options) (see Volume 2).

Table 4.1 Long List Corridor Descriptions

Corridor reference	Reasoning behind corridor creation and general description
SOUTH	
A	This corridor was developed to avoid the South Downs National Park (SDNP). It skirts the west of the National Park and Winchester. After Winchester, it heads northeast towards East Stratton, where it then goes east towards the Alton Pumping Station. This is the longest corridor in the southern section.
B	This corridor was developed as a way to reduce the length of replacement pipeline in the SDNP (but not to avoid it completely). This corridor follows the existing pipeline alignment as far as possible. This includes within the SDNP until it diverges at Preshaw Wood to approach the west of Cheriton. It heads northeast across the A31 and goes towards Heath Green and Bentworth. It then tracks east across the A339 before reaching the Alton Pumping Station.
C	This corridor was developed as a way to reduce the length of the replacement pipeline in the SDNP. This corridor follows the existing pipeline alignment as far as possible. This includes within the SDNP until it diverges northwest towards Lower Upham. It crosses the A31 north of Cheriton. Near Bentworth it goes east across the A339 before reaching Alton Pumping Station.
D	This corridor was developed as a way to reduce the length of replacement pipeline in the SDNP. This corridor follows the existing pipeline, heading northeast from Boorley Green. It passes between Bishop's Waltham and Upham, where it enters the SDNP, to as far as West Tisted. After West Tisted, it heads north, passes to the east of Ropley and skirts Heath Green. It then heads northeast and passes south of Lasham. It then heads east, crosses the A31, passes Alton and reaches the Alton Pumping Station from the west.
E	This corridor was developed as a way to reduce the length of replacement pipeline in the SDNP. This corridor largely follows Corridor B until its northern section where it diverges as it approaches Alton. It then passes between Chawton Park Wood and Bushy Leaze Wood, reaching Alton Pumping Station from the southeast.
F	In common with Option D, this option was developed as a way to reduce the length of replacement pipeline in the SDNP. It also avoids development areas to the north of Alton. This corridor follows the existing pipeline route, entering the SDNP at Bishop's Waltham. It diverges from the existing route southwest of Blackhouse Copse. It then heads north to pass around Four Marks and Chawton Park Woods. This allows the corridor to avoid re-entering the SDNP. It then passes between Chawton Park Wood and Bushy Leaze Wood, approaching the Alton Pumping Station from the southwest.
G	This corridor was developed to follow the existing aviation fuel pipeline where possible to make best use of existing infrastructure and landowner and stakeholder relationships. Its alignment through Hampshire and Surrey has taken into full

Corridor reference	Reasoning behind corridor creation and general description
	account features that weren't built or protected in the 1960's, when the existing pipeline was built. From Boorley Green, the corridor heads northeast, passing between Bishop's Waltham and Upham. Here it enters the SDNP. It then passes the village of Bramdean passing under the A272 and the A32. The final approach to Alton passes through the SDNP between Lower Farringdon and Chawton, southeast of the A31. It passes Alton before crossing the River Wey to approach the Alton Pumping Station from the southwest.
NORTH	
H	This corridor largely follows the existing aviation fuel pipeline, with a realignment being incorporated to the north to avoid going through Chobham Common SSSI/NNR, also an internationally protected SPA/SAC. This corridor begins at the Alton Pumping Station and heads to the northwest of Farnborough. It then goes in between sections of Chobham Common before heading over the M25 and north to the West London Terminal storage facility.
J	This corridor was developed to follow the existing aviation fuel pipeline where possible to make best use of existing infrastructure and landowner and stakeholder relationships. This corridor begins by heading east from Alton. It crosses the A32 and heads northeast while keeping to the southeast of Upper and Lower Froyle. The corridor continues to the southeast of Crondall before crossing the A287 and keeping to the south-eastern outskirts of Fleet. It then passes Tweseldown Racecourse from the northwest. Where the Fleet Road (B3014) meets the railway line, this corridor has two sub-options. These are areas where the corridor could follow alternative routes, but are not separate corridors. The first sub-option to the south follows the existing pipeline, passing close to Farnborough Station and through Frimley Hatches and Frimley Green. Here it joins back up with the other sub-options at The Maultway and Deepcut Bridge Road. The second sub-option to the north heads from the Fleet Road/railway line towards where the A325 crosses the A331. From here it passes close to Frimley Park Hospital, thereafter closely following the Chobham Road (B311) and the Old Bisley Road. At The Maultway it joins up with the other sub-option. This corridor travels around Bisley and Pirbright Ranges towards Chobham Common. At this point, there are two sub-options. These were created as options to potentially reduce possible impacts on the nationally and internationally important Chobham Common. The first follows the existing pipeline route through Chobham Common (NNR, SSSI and part of a wider SPA and SAC) until it joins up with the other sub-option just north of the Longcross Road and Stonehill Road junction. The second sub-option travels easterly from the B383 near Burrow Hill Green and aims to avoid crossing Chobham Common. Near Dunstall Green it turns north to follow the Stonehill Road until it joins up with the other sub-option just north of the Longcross Road and Stonehill Road junction.

Corridor reference	Reasoning behind corridor creation and general description
	At this point the corridor travels easterly until it crosses the M25, the railway line and Chertsey Road, it then heads toward the River Thames. After crossing the River Thames at Dumsey Meadow SSSI and the M3, this corridor (J), Corridor M and Corridor Q all head north, with sub-options to the west of the Queen Mary Reservoir. At the Staines Bypass the corridor merges back together and heads north until the West London Terminal storage facility.
K	This corridor largely follows the existing aviation fuel pipeline, with a realignment being incorporated to the south to avoid going through Chobham Common SSSI/NNR, also an internationally protected SPA/SAC. This corridor begins at Alton Pumping Station and heads to the northwest of Farnborough. It then goes northeast across the Blackwater River between Frimley Business Park and Frimley Bridge (A325). It then follows Chobham Road where it joins Corridor J at the junction with the B3015.
L	This corridor was developed to avoid national and European designated sites that Option J passes through and to reduce the length of replacement pipeline in floodplain areas between West Byfleet and the West London Terminal storage facility compared to Options M and Q. It also includes a realignment compared to Options M, N, O, P, Q and R to avoid the floodplain and mineral extraction areas to the east and southeast of Old Woking and Pyrford. This corridor heads east near Woking and then northeast until Walton-on-Thames. It then goes north towards the West London Terminal storage facility.
M	This corridor was developed to avoid national and European designated sites that Option J passes through. It also avoids the SDNP that Options L, O, P, Q and R all pass through. This corridor begins by following the A31 to its south-eastern side, crossing just south of Bentley. It then continues northeast following the A31 and then avoids the urban area west of Farnham before joining the A287 adjacent to Farnham Castle. The corridor then follows along streets in Farnham in a general easterly direction. It then crosses the A325 and the A31, skirting around the south of the Shepherd and Flock roundabout. The corridor heads east and crosses the River Wey to the point where Moor Park Lane and Rock House Lane meet. From this point this corridor is the same route as Corridor Q. From Rock House Lane, it goes east, parallel to Seale Lane and crosses the A31 before continuing east to Wanborough. The corridor turns northeast in Wanborough and Wanborough Wood and then follows the A323 eastbound until it reaches Holly Lane. Here it turns briefly north again to skirt around the northwest of Worplesdon, before heading east towards Sutton Green. The corridor then goes northeast, crossing the River Wey and A247 and keeping to the southeast of Woking Sewage Treatment Works. It then passes West Byfleet and Byfleet to cross the M25 near Byfleet Recreation Ground. From here, the corridor

Corridor reference	Reasoning behind corridor creation and general description
	follows the eastern bank of the River Wey, and northbound crosses the river again between Addlestone and Weybridge. Finally, the corridor crosses the Thames east of Dumsey Meadow SSSI before joining Corridor J, just before it crosses the M3. After crossing the River Thames at Dumsey Meadow and the M3, this corridor (M), Corridor J and Corridor Q all head north, with sub-options the west of the Queen Mary Reservoir. These are areas where the corridor could follow alternative routes, but are not separate corridors. At the Staines Bypass the sub-options merge back together and the corridor heads north until the West London Terminal storage facility.
N	This corridor was developed to avoid national and European designated sites that Option J passes through and to reduce the length of replacement pipeline in floodplain areas between West Byfleet and the West London Terminal storage facility. It also avoids the SDNP that Options L, O, P, Q and R all pass through. This corridor crosses the A31 just south of Bentley. It follows the A31, avoiding the urban area just west of Farnham, before joining the A287 next to Farnham Castle. The corridor heads in an easterly direction before crossing the A325 and A31. It then skirts around the south of the Shepherd and Flock roundabout. Finally, the corridor goes east and crosses the River Wey where it travels north to the West London Terminal storage facility.
O	This corridor was developed to avoid national and European designated sites that Option J passes through and to reduce the length of replacement pipeline in floodplain areas between West Byfleet and the West London Terminal storage facility. It also avoids the community of Farnham that Options M and N pass through. This corridor heads east, crossing the A325 and Alice Holt Forest. It crosses the A287 and keeps east of Farnham where it heads east to cross the A31. The corridor then goes towards Sutton Green, before heading northeast to the M25 and north up to the West London Terminal storage facility.
P	This corridor was very similar to Option O, other than the final 5km section approaching the West London Terminal storage facility. This section passed round the southwest of Feltham to try to reduce the length of the pipeline installed in roads. This corridor heads in an easterly direction. It goes near to Woking and in a northeast direction until Walton-on-Thames. It heads north by diverting west of Feltham towards the West London Terminal storage facility.
Q	This corridor was developed to avoid national and European designated sites that Option J passes through. It also avoids the community of Farnham that Options M and N pass through. The corridor begins by heading east from Alton Pumping Station. It crosses the A325 and Alice Holt Forest (western section) within the SDNP before approaching the northwest of Frensham. After crossing the A287, the corridor heads north by skirting east of Alice Holt Forest (eastern section) and keeping to the east of Farnham.

Corridor reference	Reasoning behind corridor creation and general description
	At the point where Moor Park Lane and Rock House Lane meet, this corridor is the same as Corridor M. From Rock House Lane, it goes east, parallel to Seale Lane and crosses the A31 before continuing east to Wanborough. The corridor turns northeast in Wanborough and Wanborough Wood and then follows the A323 eastbound. Here it reaches Holly Lane where it turns briefly north again to skirt around the northwest of Worplesdon. It then heads east towards Sutton Green. It goes northeast, crossing the River Wey and A247, keeping to the southeast of Woking Sewage Treatment Works. Then it passes West Byfleet and Byfleet to cross the M25 near Byfleet Recreation Ground. From here, the corridor follows the eastern bank of the River Wey, and northbound crosses the river again between Addlestone and Weybridge. Finally, the corridor crosses the Thames east of Dumsey Meadow SSSI before joining the same corridor as Corridor J, just before it crosses the M3. After crossing the Thames at Dumsey Meadow and the M3, this corridor (Q), Corridor J and Corridor M all head north, with sub-options to the west of the Queen Mary Reservoir. These are areas where the corridor could follow alternative routes, but are not separate corridors. At the Staines Bypass, the sub-options merge back together and the corridor heads north until the West London Terminal storage facility.
R	This corridor was developed to avoid national and European designated sites that Option J passes through. It also avoids the community of Farnham that Options M and N pass through. Unlike Options L, N, O and P, the alignment for Option Q turns west to pass through the floodplain south of the River Thames. It then re-joins Option J just south of the M3, avoiding pipeline routing through the communities of Walton-on-Thames, Sunbury-on-Thames, Feltham and Bedfont. This corridor heads east, near to Woking and northeast until Walton-on-Thames. Here it heads west, crossing the River Thames to the east of D'Oyly Carte Island. It then goes northwest, crosses the M3 and joins the West London Terminal storage facility.

Sifting of the Long List to Determine the Short List

4.5.22 The long list corridors were reviewed again and updated where there were opportunities to take account of environmental, planning and engineering features. This included early stakeholder feedback.

4.5.23 The long list corridors were sifted in accordance with the adopted methodology in a multi-disciplinary workshop. Each corridor option was assessed using a set of sifting criteria developed to cover the same topic areas used to produce the long list, namely engineering/constructability, environmental and social, planning and cost/schedule.

4.5.24 The assessment identified strength and weaknesses, with each discipline using a five-grade system ('very weak' to 'very good'). Assigned scores of the same grade were all counted as equal. Assessments considered the Project Objectives and Guiding Principles. The scores were used to inform selection of the short list.

4.5.25 As a result of the long list sifting process, the following six corridors were taken forward to the short list presented to the public in the pipeline choices consultation (non-statutory) in March/April 2018.

- South: Options D, F and G; and
- North: Options J, M and Q.

4.5.26 The main reasons for taking Options D, F, G, J, M and Q forward to the short list are outlined in Table 4.2. The alignments of the six short list corridor options are also illustrated on Figure 4.4 (South) and Figure 4.5 (North) (see Volume 2).

Table 4.2 Main reasons Corridors taken forward to Short List

Corridor	Main reasons Corridors taken forward to the Short List
SOUTH	
D	This corridor shares the same corridor as Option G until West Tisted. At this point this corridor travels northeast, skirting to the south of Lasham. This is to avoid Chawton Wood and Bushy Leaze Wood. It then approaches the Alton Pumping Station from the west. In common with Option F, this is one of the shortest corridors within the SDNP.
F	This corridor avoids development areas to the north of Alton. This corridor shares the same corridor as Option G until West Tisted. At this point this corridor travels northeast, skirting to the northern edge of Four Marks. It approaches the Alton Pumping Station from the southwest. In common with Option D, this is one of the shortest corridors within the SDNP.
G	This corridor was developed to follow the existing aviation fuel pipeline where possible to make best use of existing infrastructure and landowner and stakeholder relationships. The corridor avoids Ancient Woodland, and its alignment through Hampshire and Surrey has taken account of features that weren't built or protected in the 1960's, when the existing pipeline was built.
NORTH	
J	This corridor was developed to follow the existing aviation fuel pipeline where possible to make best use of existing infrastructure and landowner and stakeholder relationships. Its alignment through Hampshire and Surrey

Corridor	Main reasons Corridors taken forward to the Short List
	has taken into full account features that weren't built or protected in the 1960s, when the existing pipeline was built.
M	This corridor was developed to avoid national and European designated sites that Option J passes through. It also avoids the SDNP, that Option Q passes through.
Q	This corridor was developed to avoid national and European designated sites that Option J passes through, as well as to avoid the community of Farnham that Option M passes through. This corridor follows the route of another Esso pipeline, along a route through Alice Holt Forest and within the SDNP.

4.5.27 The eleven corridors not taken forward to the short list were:

- South: Options A, B, C and E; and
- North: Options H, K, L, N, O, P and R.

4.5.28 The main reasons for these eleven corridors not being taken forward to the short list are outlined in Table 4.3.

Table 4.3 Main reasons Corridors not taken forward to the Short List

Corridor	Main reasons Corridors not taken forward to the Short List
SOUTH	
A	This corridor was created to avoid the SDNP by passing to the west of Winchester. This made it the longest of the southern corridors. The corridor also had to pass through environmentally sensitive areas between Otterbourne and Colden Common, including the River Itchen SSSI and SAC, and an important Groundwater Source Protection Area Zone 1. This meant that the corridor was unlikely to have better environmental outcomes than others. The cultural heritage features around the northeast of Winchester, as well as emerging housing allocations, were also considered to be material challenges for this corridor.
B	Similar to Option C, this corridor was developed as a way to reduce the length of replacement pipeline in the SDNP (but not to avoid it completely). The corridor was unlikely to have better environmental outcomes than other corridors, as it crossed the River Itchen SSSI/SAC and partially encroached on the historic battlefield at Cheriton.
C	This corridor was developed as a way to reduce the length of replacement pipeline in the SDNP. Appraisal indicated that it was unlikely to have better environmental outcomes than other corridors as it crossed the River Itchen SSSI/SAC and partially encroached on the historic battlefield at Cheriton.
E	Similar to Option C, this corridor was developed as a way to reduce the length of replacement pipeline in the SDNP. Appraisal indicated that it was unlikely to have better environmental outcomes than other corridors, as it crossed the River Itchen SSSI/SAC and partially encroached on the historic battlefield at Cheriton.

NORTH	
H	This corridor was created to avoid going through Chobham Common SSSI/NNR, also an internationally protected SPA/SAC. A significant length of the pipe would be installed in Staplehill Road and Longcross Road (B386), in between areas of Chobham Common. This would make it much more complex and time-consuming to install and result in greater disruption and impact for communities.
K	This corridor was not taken forward because a significant section, between Farnborough and Lightwater, would need to be laid in roads. This would make it significantly more complex and time-consuming to install and result in greater disruption and impact for communities.
L	This corridor is similar to Option O, other than the section between Worplesdon and Byfleet. Here it passed further north-west to avoid the floodplain and mineral extraction areas to the east and southeast of Old Woking and Pyrford. This takes Option L into Woking, increasing the impacts on roads and communities from those identified for Option O.
N	This corridor is similar to Option O apart from the southern section. Here it passed through Bentley, Dippenhall and Farnham to avoid the SDNP around Blacknest. As such, it shared similar issues for installation, disruption and community impact and so was not taken forward.
O	This corridor was not taken forward because this section would mainly be installed in roads through Whiteley Village, Walton-on-Thames, Upper Halliford and Staines. This would make it much more complex and time-consuming to install and result in greater disruption and impact on communities.
P	This corridor was very similar to Option O, other than the final 5km section approaching the West London Terminal storage facility. This section passed round the southwest of Feltham to try to reduce the length of the pipeline installed in roads. On assessment, this showed no reduction in road installation could be achieved and was not taken forward.
R	This corridor was similar to Option O, other than the final 12km section, which passed to the west of the Queen Mary Reservoir. This reduced the length of pipeline installed in roads but led the corridor into the floodplain along the River Thames between Chertsey Meads and Walton-on-Thames. The considerable complexity of installing the pipeline in the floodplain was a particular issue for this corridor. There also remained substantial lengths of pipeline requiring installation in roads and for these key reasons this corridor was not taken forward.

Appraisal of the Short List

4.5.29 Each of the short list corridors was assessed using a set of appraisal criteria developed to cover the same topic areas used for sifting the long list, namely engineering/ constructability, environmental and social, planning and cost/schedule.

4.5.30 Any new information was also taken into account. Assessments considered the Project Objectives and Guiding Principles.

4.5.31 Each discipline assessed strengths and weaknesses using the five-grade system ('very weak' to 'very good'). Assigned scores of the same grade were considered to be equal. The resulting scores informed identification of the favoured corridor to be taken forward for further technical work.

4.5.32 The short list was taken forward for consultation.

Selection of Preferred Corridor

4.5.33 Following the close of the consultation on 30 April 2018, an independent consultation expert collated all of the consultation responses, which were then analysed by the Project's senior management team with support from the environmental, engineering and planning teams. Following further review of technical data, the selection of the preferred pipeline corridor was announced on 30 May 2018.

4.5.34 The Project identified corridor option G in the south and corridor option J in the north to progress as the preferred corridor. These corridors performed best when measured against the Project Objectives and Guiding Principles, and are those that most closely follow the existing pipeline. When the two corridors are combined they form the single preferred corridor.

4.5.35 The preferred corridor was taken forward for development of the pipeline route design.

4.5.36 The main reasons for selecting Options G and J are outlined in Table 4.4. The alignments of the two corridor options selected are also illustrated on Figure 4.6 (South) and Figure 4.7 (North) (see Volume 2).

Table 4.4 Main reasons Corridor selected for the Preferred Corridor

Corridor	Main reasons Corridor selected for the Preferred Corridor
G	Option G performed more strongly overall than Options D and F. There was a strong representation from the consultation responses that the replacement pipeline should be located near to the existing pipeline. Key reasons given were the positive existing relationships with landowners and the opportunity to use land and land access routes along the existing pipeline. Option G is significantly shorter from the point the corridor options diverge and there are fewer engineering challenges in this corridor. It also has a lower risk of disruption to residential areas such as Alton and Ropley, less potential to affect cultural heritage assets and groundwater systems. Unlike Options D and F, Corridor G does re-enter approximately 5km of the SDNP to the south of Alton. When installation is complete and the land has been reinstated, where possible, to its previous state, it is anticipated that there would be no permanent effect on the special qualities of the SDNP, such as the natural beauty of the landscape and countryside. The Project is committed to continue working closely with the South Downs National Park Authority to

Corridor	Main reasons Corridor selected for the Preferred Corridor
	develop the route. This will include exploring mitigation techniques and looking for opportunities for enhancing the local environment. This will assist in ensuring that short or medium term effects on the special qualities of the SDNP are avoided or reduced. Option G is preferable to the community-related impacts and engineering challenges associated with Options D and F. For these reasons, Option G was selected for the preferred corridor.
J	Option J performed more strongly overall than Options M and Q. There was a strong representation from respondents that the replacement pipeline should be located near to the existing pipeline, due to existing positive relationships with landowners and the opportunity to use land and land access routes along the existing pipeline. Option J was favoured due to its avoidance of Farnham, Alice Holt Forest, the River Wey and high water table in that area. Option J passes through or near more designated nature conservation sites, but the team concluded that careful route development and appropriate design and mitigation measures would reduce the risk of adverse effects on these sites. There was a common theme raised about the impact on communities and traffic during installation, especially around the Farnborough and Frimley area. The Project team is working to reduce these potential impacts through careful route design and planning of the installation of the pipeline. For these reasons, Option J was selected as the preferred corridor.

4.5.37 The four corridors not taken forward as the preferred corridor were:

- South: Options D and F; and
- North: Options M and Q.

4.5.38 The main reasons for these four corridors not being taken forward as the preferred corridor are outlined in Table 4.5.

Table 4.5 Main reasons Corridors not selected for the Preferred Corridor

Corridor	Main reasons Corridors not selected for the Preferred Corridor
D	Option D performed less strongly than Option G due to its significantly longer length – 22.5km from the point the corridors diverge (Option F being around 19.9km and Option G being around 17.8km). Compared to Options G and F, this corridor had greater engineering and installation challenges, such as the hilly landscape and groundwater SPZs near Lasham. It also had additional crossings over the Watercress railway line and A31 road. Respondents highlighted these issues, as well as impacts on wildlife and the potential issues of installing in an area where many roads are narrow country lanes. When compared to Option G, there was less potential to benefit from existing infrastructure and landowner relationships, as once it diverged from the other two corridors it did not follow any existing pipelines. Option D also included part of the Cuckoo Corner Roman site, a scheduled monument. For these reasons, Option D was not taken forward.
F	Option F performed less strongly than Options D and G due to the possibility of greater disruption to communities such as Alton and needing additional crossings over the Watercress railway line and A31 road. This option also performed less strongly when compared to Options D and G

Corridor	Main reasons Corridors not selected for the Preferred Corridor
	due to its proximity to areas of woodland, such as Chawton Wood. In addition, during the consultation, The Project also received new information that identified a priority habitat for hydrology in this area. Concerns were also raised by respondents about maintaining easy access to Alton Community Hospital and the impact on growing local communities during installation of the pipeline. For these reasons, Option F was not taken forward.
M	Option M passes through Pyrford and Byfleet and these areas presented significant engineering and installation challenges. These include crossing the River Wey and the high water table in this area that results in frequent flooding. Consultation responses strongly highlighted the rich cultural and historical heritage in these areas. There was a lower potential for benefiting from existing infrastructure and landowner relationships. Consultation responses showed that many respondents who opposed Options M felt the replacement should, where possible, follow the existing pipeline. Option M performed less strongly due to its path through the historic town of Farnham. Many consultation responses highlighted the community, heritage and business impacts of the route passing through Farnham. These themes included the engineering challenges of the narrow roads, archaeology around Farnham Park, the number of listed buildings and the planned redevelopment of the town centre (starting in August 2018). The traffic impact of installation was likely to be greater in Farnham, when compared to other areas, due to the relatively narrow roads and the volume of traffic.
Q	Option Q also passes through Pyrford and Byfleet, and as described above for option M, these areas presented significant engineering and installation challenges. Like Option M, Option Q also has a lower potential for benefiting from existing infrastructure and landowner relationships. Consultation responses also showed that many respondents who opposed Options Q felt the replacement should, where possible, follow the existing pipeline. Option Q performed less strongly due to the potential impact on Alice Holt Forest (part of the SDNP). The forest was highlighted by many in the consultation responses as being an important community and environmental asset. It also crossed about 5.2km of the Surrey Hills AONB. For these reasons, Option Q was not taken forward.

Review of Option J Sub-options

4.5.39 Following the selection of Option J for the preferred corridor, a further review was undertaken accounting for strong feedback from the pipeline options consultation (non-statutory) relating to the sub-options in Frimley, Chobham Common and Queen Mary Reservoir.

4.5.40 As a result of this review, the Frimley Park Hospital sub-option was de-selected from Corridor Option J due to the potential impact on the hospital, schools and local roads during installation. This sub-option was in the favoured corridor but was deleted from the design on which this Scoping Report is based to reflect the consultation feedback.

4.5.41 The potential technical challenges associated with the Option J sub-options in Chobham Common and Queen Mary Reservoir require further work, such as surveys and discussions with landowners, which will require more time to complete. These sub-options are therefore included within this Scoping Report.

4.6 Development of the Route

4.6.1 Initial engineering work within the favoured corridors was taken forward for further phases of design development, providing a route and outline design information on which the Scoping exercise has been based. The outline design includes working area requirements, including construction compounds, access routes and other installation related requirements.

Design Development Approach Overview

4.6.2 Throughout the iterative design development process, the proposed pipeline route, AGIs and associated permanent and temporary infrastructure designs were systematically reviewed. This was achieved with feedback received from the multi-disciplinary project team being recorded and incorporated as appropriate in the next stage of the proposed design.

4.6.3 Feedback received as a result of consultation and engagement with stakeholders, including responses received from the pipeline options consultation (non-statutory) in March/April 2018, was also taken into account as part of the design development process.

4.6.4 The design development process included the identification of mitigation commitments, both for mitigation embedded in the design and also good practice mitigation.

4.6.5 The pipeline route used as the basis for the Scoping Report was agreed following several design iterations taking into account the information outlined above.

4.6.6 It is important to note that the proposed design of the pipeline route, AGI and associated infrastructure will continue to evolve as further information is received and design iterations are progressed. A further refinement of the Project design will therefore form the basis of the Preliminary Environmental Information Report (PEIR) for statutory consultation. The Project design will then continue to be refined for the ES to be submitted with the application for development consent.

4.6.7 The design development approach adopted by the Project for the main elements of the Project design is summarised below.

Route Development

4.6.8 The pipeline route used as the basis for the Scoping report was determined in accordance with the iterative design development process described above. Key considerations for development of the route, in addition to Project Objectives and Guiding Principles, included:

- Avoiding or reducing effects to environmentally sensitive areas, e.g. SSSI, SAC, Ancient Woodland;
- Reducing impacts to residential areas, farmhouses and businesses;
- Ensuring that the routing allows takes account of constraints imposed by major crossings, e.g. Motorways, Trunk Roads, Rivers and Canals and Railways;
- Reducing utility crossing and diversions;
- Optimising re-use of excavated material;
- Avoiding steep gradients and side slopes were possible;

- Avoiding difficult geological features, mining areas and unsuitable ground conditions where possible.

4.6.9 The Order Limits and route design developed for Scoping are described in Chapter 3 and shown on Figure 3.1 and Figure 3.2 (Sheet 1 of 14 to Sheet 14 of 14) (see Volume 2).

Pigging Station at Boorley Green

4.6.10 The design development for the pigging station at Boorley Green also followed the iterative design development process described above.Considerations for the development of the pigging station design included:

- The replacement pipeline is required to connect to the new pigging station located near Boorley Green.
- A pigging station is also required due to the change in diameter from the existing pipeline to the replacement pipeline.

4.6.11 The approximate location of the new pigging station is shown on Figure 3.2 (Sheet 2 of 14) (see Volume 2). It should be noted that the location of the new pigging station has yet to be confirmed.

4.6.12 The indicative layout of the pigging station near Boorley Green developed for Scoping is shown on Figure 3.3 (see Chapter 3).

Valve Chambers

4.6.13 The design development for in-line valves also followed the iterative design development process described above. Criteria for determining the number and locations of valves is based on the British Standard Code of Practice for Pipelines BS PD 8010, and includes consideration of:

- Topography, to limit drain down of pipeline contents at low points;
- Limiting drain down of pipeline contents in sensitive areas, including areas of high population density, or in areas where environmentally sensitive receptors are present;
- Ease of access, including ready availability of power supplies.

4.6.14 The indicative locations of the valves are shown on Figure 3.2 (Sheet 2 of 14 to Sheet 14 of 14) (see Volume 2).

4.6.15 The indicative layout of a typical valve enclosure developed for Scoping is shown on Figure 3.5 (see Chapter 3).

Construction compounds, pipe storage, additional working areas and side access

4.6.16 The design development for construction compounds, pipe storage, additional working areas and access from the road network, again followed the iterative design development process described above. As part of this process the Project team sought to avoid areas of high environmental and social sensitivity, and the design has sought to reduce effects on receptors wherever practicable. The Project team has also sought to minimise the duration over which temporary construction compounds and pipe storage areas would be deployed in sensitive areas, for example the SDNP. Criteria for determining the number and locations of such

temporary infrastructure included:

- Construction compounds and pipe storage locations were selected and sized to be able to efficiently and safely receive and store the construction materials, which include the pipe sections in 3m, 6m, or 12m lengths. The location and number of construction compounds and pipe storage areas were determined through a balanced appraisal of the most efficient locations for construction management purposes, while accounting for environmental and socio-economic impacts,
- The construction compounds were also designed to provide facilities for employee parking, local offices for site managers and welfare facilities;
- Additional working areas were incorporated along the route to provide working space for specific construction operations such as trenchless working and road crossings and were located adjacent to the route. The additional working areas were sized giving consideration for the types of construction operations that could potentially be used in each location. The selection of the additional working areas considered the potential environmental impacts such as noise, increased vehicle movement and visual impact;
- Selection of the compounds along the pipeline route sought to reduce transportation times and overall vehicle movements. As such, selected sites were located as close to the replacement pipeline route and suitable logistics routes as possible in order to provide adequate access, whilst giving consideration to road safety and the potential environmental impacts such as noise, increased vehicle movement and visual impact.

4.6.17 The approximate locations of the construction compounds are shown on Figure 3.2 (Sheet 2 of 14 to Sheet 14 of 14) (see Volume 2), although it should be noted that the location of the construction compounds has yet to be confirmed.

4.6.18 The indicative layout and location of the main pipe storage compound at Alton Pumping Station and a typical rural construction compound used as the basis for scoping are shown in Figure 3.9 and Figure 3.10 respectively (see Chapter 3).

4.7 Mitigation by Design

4.7.1 The embedded and good practice mitigation set out in this Scoping Report is intended to mitigate potential environmental impacts, and represents what is currently expected to be included in the design and documentation at development consent application submission. The Scoping Report is based on the assumption that the stated embedded and good practice mitigation, or similar, will be implemented. Should ongoing design development and changes to good practice standards require a material change to the assumed mitigation, then the scoping process would be revisited to ensure robust EIA is undertaken. Should this occur, it would be fully reported in the ES.

Embedded Mitigation

4.7.2 As a key part of the development of the route for Scoping, the Project has considered potential environmental impacts for which embedded mitigation is appropriate. The embedded mitigation assumed for Scoping includes a number of Project-wide design measures, plus a list of more specific design measures associated with the development of the route. It also includes the positioning of valves and temporary infrastructure required for construction.

4.7.3 A summary of Project-wide embedded mitigation assumed for Scoping is provided in Table 4.6.

Table 4.6 Project-wide embedded mitigation assumed for Scoping

Embedded Mitigation	Purpose
Commitment to only utilise a 10m width when crossing through boundaries between fields where these include hedgerows, trees or watercourses.	To reduce loss of habitats.
Design route alignment to avoid all areas of existing classified Ancient Woodland.	To avoid loss of existing classified Ancient Woodland.
The standard working width, for open trench construction in rural areas, is a nominal 30m.	To reduce working area and loss of habitats, soil impacts, etc.
Trenchless techniques are to be used for all crossings of trunk roads, motorways and railways	To avoid the need for closures resulting in major effects on commuters and communities.
Trenchless crossing technology to be used for crossings of waterways over 30m wide.	To avoid or reduce construction effects to the environment, navigation, etc.
The pipeline as laid will not lie within existing source protection zone 1 (SPZ 1) areas.	To reduce risk of potential effects on protected aquifers.
Where required, water stops (or “stanks”) would be installed at intervals through the pipe bedding and side fill.	To reduce groundwater flow along the pipeline.

The principles of inherent safe design have been incorporated into the design of the pipeline as per Esso design standards for fuel pipelines, relevant industry codes of practice and standards and the requirements of the Pipeline Safety Regulations 1996.	To avoid potential impacts to sensitive environmental receptors.
Inclusion of remotely operated valves to allow isolation of sections of the pipeline if required.	To avoid potential impacts to sensitive environmental receptors.
24-hour remote monitoring of pipeline operation to detect leaks and enable remote shut down of the pipeline if required.	To avoid potential impacts to sensitive environmental receptors.

4.7.4 Embedded mitigation relating to a specific location or receptor, broken down by Section of the route (Sections A to H, see Chapter 3), is provided in Table 4.7. In addition to this mitigation, there have been numerous small amendments to the route or width of Order Limits to:

- avoid individual or groups of trees and hedges;
- use existing openings in boundary hedges for access;
- use existing access tracks;
- avoid flood risk areas; and
- avoid residential properties.

4.7.5 The embedded mitigation set out in this Scoping Report represents what is currently expected to be included in the design and documentation at development consent application submission. The Scoping Report is based on the assumption that the stated mitigation, or similar, will be implemented. Should ongoing design development require a change to the assumed mitigation, then the scoping process would be revisited to ensure robust EIA is undertaken. Should this occur, it would be fully reported in the ES.

4.7.6 Following on from the Scoping phase, the EIA will capture further design development in order to identify likely significant effects and any additional design measures to reduce them. The additional mitigation measures identified by the EIA will be incorporated into the ES.

4.7.7 The embedded mitigation will be incorporated into the ES and Register of Environmental Actions and Commitments (REAC) to be submitted with the application for development consent. Mitigation has been identified through the development of the preferred option, including selection of the preferred corridor and design of the pipeline route, along with the additional embedded mitigation measures identified by the EIA.

Table 4.7 Location-specific embedded mitigation assumed for Scoping

Section	Area/Location	Embedded Mitigation	Purpose
A	Next to former Botley Park Golf course	Trenchless under stream and woodland belt with no haul road. Entry from north and south direction.	To protect stream and woodland.
A	Next to former Botley Park Golf course	Trenchless working area to be moved south.	To have less impact on grazing marsh Priority Habitat, Sites of Importance for Nature Conservation (SINC) and groundwater.
A	Maddoxford Lane, Boorley Green	Order Limits move to north side of Maddoxford Lane.	To avoid area for future housing.
A	Gregory Lane	Trenchless construction under mature oak tree line north of Gregory Lane with no haul road. Use existing field access opposite farm entrance to access, or access from north and south access points.	To protect mature oak line.
A	North of Gregory Lane	Existing pipe is parallel and close to row of mature trees which are Priority Habitat. Move pipe positioning west of existing line.	To avoid tree impact on Priority Habitat.
A	North of Minchingfield Lane	Existing pipe is parallel and close to row of mature trees which are Priority Habitat. Move pipe positioning west of existing line.	To avoid tree impact.
A	North of Winchester Road	Narrow working width to use existing hedge gap.	Avoid damage to mature hedge.
A	North of Cross Lane	Move haul road west away from trees.	Avoid mature tree Priority Habitat.
A	Stephens Castle Mound	Diversion to the west.	To avoid four Priority Habitats, SINC and racecourse. Chalk grassland is difficult to restore and is within SDNP.
A	Belmore Road	Revised pipe alignment.	To reduce impact on priority habitats, hedge crossings and follow field boundaries.

Section	Area/Location	Embedded Mitigation	Purpose
A	North of Stakes Lane	Redesign/position of compound. Move into cover of hedge to lessen visual impact.	To make less visible in SDNP. Good location with existing access but within SDNP
A	North of Sailors Lane	Move pipe positioning to north beyond tree line. Split haul road and pipe.	Avoid mature tree Priority Habitat and reduce impact on Public Rights of Way (PRoWs).
A	North of Sailors Lane	Move pipe positioning to east.	To avoid tree belts connected to Ancient Woodland. Creates a gentle diversion in fertile fields and avoids Wayfarers Way.
A	North of Sailors Lane	Existing pipe is parallel and close to block of mature trees. Move pipe positioning to West of existing.	Avoid impact on Priority Habitat – large woodland block.
A	Wheely Down Road	Locate compound north of Wheely Down Road. Field to north is screened from South Downs Way.	Avoids views from South Downs Way.
A	Kilmeston Road	Use existing gap in hedgerow.	Reduces impact on north hedge which is Priority Habitat.
A	Hinton Ampner	Create options to avoid Ancient Woodland at Hinton Ampner but also four Priority Habitat and two SINCs to the east.	Avoid Ancient Woodland, Priority Habitats and SINCs.
A	East of Hinton Ampner	Use existing gap to avoid Ancient Woodland belt.	Avoid Ancient Woodland.
A	Brockwood School	Create options to avoid parkland with mature trees at Brockwood School.	Avoidance of trees that appear to be important specimen trees and reduce impacts on school
A	Godwin Plantation	Adjust pipe positioning to the west to avoid SINC and Priority Habitat - large block of woodland West of Brockwood School.	Avoidance of SINC, Priority Habitat and trees that have bat potential.
A	A272	Trenchless crossing under A272 and habitats either side.	Reduce impact on Priority Habitat, Flood Zone 2 and groundwater flooding.
A	A272	Use existing field access from Brockwood to avoid	Lessen tree loss.

Section	Area/Location	Embedded Mitigation	Purpose
		trees off of A272.	
A	South of Netherhill Lane	Small adjustment of haul road to North.	Avoid mature tree Priority Habitat.
B	A272	Use existing field access from lane to avoid tree loss off of A272.	Lessen tree loss.
B	North A272	Move haul road west.	Lessen tree loss.
B	North A272	Move haul road west.	Lessen tree loss.
B	North-West of West Tisted	Minor repositioning – move to the east to avoid Priority Habitat woodland block.	Lessen tree loss in Priority Habitat.
B	South of Kitwood Lane	Divert haul road to use existing gaps in hedge.	Avoid removal of mature trees.
B	Hawthorn Road	Change haul road to use existing hedge gaps.	Avoid Priority Habitat.
B	West of Woodside Lane	Pipe positioning moved to south.	To avoid Ancient Woodland and SINC.
B	South of A32	Pipe positioning moved to the south.	Avoid previous infilled gravel pit.
B	A32 North of Lower Farringdon	Trenchless under the A32, mature trees and Flood Zone 2.	To avoid mature trees and Flood Zone 2.
B	East and West of A32 North of Lower Farringdon	Use existing access off of A32 and side road.	To reduce tree loss.
B	North of Lower Farringdon	Use existing farmer's track and narrow working width.	To avoid impact to Ancient Woodland and reduce impacts on two areas of Priority Habitat.
B	Woodside Lane	Pipe positioning moved to south.	To reduce impact to SINC and Priority Habitat hedge.
B	Hawthorn Lane, Four Marks	Pipeline route moved to south.	To reduce length of route in golf course.

Section	Area/Location	Embedded Mitigation	Purpose
C	Lane to Froyle	Use hedge gaps and existing field entrance.	Avoid mature oaks and 'heritage' wall.
C	North of lane to Froyle	Adjust pipe positioning.	To avoid historic landfill.
C	South of Gid Lane	Order Limits widened.	To allow for routing to avoid the Root Protection Areas of mature trees.
C	South of Gid Lane Ryebridge Stream	Use existing gaps in hedge.	Avoid mature trees.
C	North of Islington Lane	Move haul road west to avoid woodland block which is a Priority Habitat.	Avoid Priority Habitat.
C	West of Hole Lane	Move haul road to use existing hedge gap.	Lessen impact on trees and scrub.
C	East of Hole Lane	Move haul road east to avoid woodland block.	Avoid woodland.
C	Crondall Lane	Move haul road west to use existing access.	Avoid woodland block which is Priority Habitat.
C	North Crondall Lane	Move haul road west to use existing access.	Avoid minimising gap between two hedgerows.
C	River Wey	Trenchless under River Wey and next to wetland Priority Habitat, into Alton compound.	Avoid main river, Flood Zone 2 and Priority Habitats.
C	River Wey	Move trenchless compound.	Avoid impact on PRoW.
C	North of Selbourne Lane re solar farm	Move positioning to south and east.	To lessen impact on various Priority Habitats and SINCs and Flood Zone 2.
D	Crondall	Avoid north option behind Crondall.	Due to social impact, Conservation Area, Priority Habitat and Flood Zone 2.
D	Oak Park Golf Course, Crondall	Revised alignment several times.	Reduce impact on playing areas, avoid trees and teeing platform on golf course.
D	South of A287	Minor re-positioning/haul road to be moved west.	Avoidance of Ancient Woodland and SINC.
D	Peacocks Nursery A287	Use trenchless under A287, Nursery and woodland strip.	Avoid impacts to nursery business and the mature tree belt.

Section	Area/Location	Embedded Mitigation	Purpose
D	Naishes Lane, Church Crookham	Add route option along Sandy Lane.	Would avoid SINC woodland.
D	West of Reading Road South	Add route options through Vertu commercial estate car park.	To reduce impacts on SINC and Priority Habitat woodland.
D	Bourley and Long Valley SSSI/SPA	Use the existing tracks north of Aldershot road rather than habitat-area.	Lessen impacts on Special Protection Area (SPA) Site of Special Scientific Interest (SSSI), Flood Zone and Priority Habitats.
D	Basingstoke Canal SSSI and Bourley and Long Valley SSSI	Move northern trenchless location to cleared area.	Reduce area of works within habitat areas.
D	Eelmore Marsh SSSI	Move pipe positioning into Old Ively Road or cycle track – narrow working width.	To ensure route is out of SSSI and unlikely to impact wetland.
D	Cody Technology Park	Move pipe positioning into Old Ively Road or cycle track – narrow working width.	To reduce requirement for tree removal.
D	East of Cody Technology Park	Move alignment to use Southwood Golf Course.	This golf course is to be discontinued and developed into a Suitable Alternative Natural Greenspace (SANG). Early communication with Rushmoor Borough Council may allow environment friendly route.
E	South of Cove Road	Move positioning to west into golf course.	To reduce impact on SINC, Priority Habitats and Flood Zone 2.
E	South of Cove Road	Provide trenchless options across Cove Brook and railway.	Alternative routes either avoid the doctors' surgeries, or the SINC at this location, but not both.
E	Queen Elizabeth Park access and play area	Restore/improve playground if pipe positioning can't be avoided.	To offset potential social and recreational effects, as recently built children's play area and park

Section	Area/Location	Embedded Mitigation	Purpose
			entrance are located directly within the Order Limits.
E	Farnborough North Station/ the Hatches	Trenchless under one or two railways and the A331 including scrub areas either side.	Avoids impacts on two SINCs.
E	Frith Wood	Split haul road to east. Narrow working width.	Maintain line of mature trees.
E	Frith Wood Road	Use space within Frith Hill forestry road.	To reduce impacts on mature trees and the possible historic feature.
E	Pine Ridge Golf Centre	Use Frith Hill forestry track and Deepcut Bridge Rd/verge. Avoid Tree Protection Order trees if possible.	Avoid impact to golf course, trees and related habitat.
E	Highfield Path, Cove	Alignment moved into road and Order Limits adjusted over a length of 280m.	Former alignment in residential gardens. Design change reduces impacts on residential housing.
E	The Hatches	Switch to north of the existing pipeline route and back again, including trenchless crossing underneath the 'Frimley Hatches Pit 1' waterbody.	To avoid impacts on the 'Frimley Hatches Pit 2', 'Frimley Hatches Pit 3' and 'Frimley Hatches Pit 4' waterbodies.
E	Ship Lane Farnborough	Alignment through private gardens.	To increase distance to houses and reduce impacts on residential housing.
E	East Frimley Fuel Allotments	New connection corridor options and sub-options.	Alternative to Pine Ridge Golf Centre route.
F	Colony Bog and Bagshot SSSI/SPA	Place compound in grassland area next to Maultway.	Avoidance of important habitat type.
F	Colony Bog and Bagshot SSSI/SPA Heathland	Use the existing Ministry of Defence track plus narrow working area.	To reduce the impact on the heathland habitat and mature trees.
F	Colony Bog and Bagshot SSSI/SPA	Manage some habitat improvements to heathland areas next to the track, especially for SPA habitat	To mitigate any temporary habitat loss due to pipe positioning.

Section	Area/Location	Embedded Mitigation	Purpose
	Heathland	features.	
F	Colony Bog and Bagshot SSSI/SPA Wetland	Move pipe positioning to follow high ground to the north or even lay in existing track.	Avoid impact on the wetland/bog SSSI.
F	Colony Bog and Bagshot SSSI/SPA Wetland	Move pipe positioning for a short section into Red Road to further avoid wetland/bog.	Avoidance of impact on wetland/bog SSSI.
F	Colony Bog and Bagshot SSSI/SPA	Ensure trenchless working area for A322 is outside of SSSI/SPA.	To reduce the impact on the SSSI/SPA.
F	Hookstone Lane	Move compound from Hookstone Lane to beside working area.	To reduce loss of mature trees in the area from additional access route.
F	North-East of Windlemere Golf Course	Trenchless under river and stream. Adjust pipe positioning east at river crossing.	Results in one instead of two river crossings.
F	Silverland Stone	Move pipe positioning to south.	To avoid Ancient Woodland.
F	Chobham Common SSSI and SPA Heathland	Use the existing track for pipe laying plus narrow working area to the side. Widen Order Limits to give flexibility.	Currently a fairly narrow corridor based on existing positioning. The wider Order Limits allow routing to be designed to reduce temporary impacts on SPA habitat at this location.
F	Halebourne Lane, Windlesham	Order Limits changed on south side.	Avoidance of private swimming pool.
F	Windlemere Golf Centre	Option through school playing field partially dropped and alternative link alignment added north of Hookstone Lane.	Long length of installation in highway along Red Road reduces impact on school playing field.
F	West of Chobham	Alternative alignment added.	To avoid polo fields and plant nursery.
F	Blackstroud Lane East, Surrey Heath	Reposition compound in former Windlemere Golf Centre.	To facilitate access whilst reducing losses of trees and hedges.

Section	Area/Location	Embedded Mitigation	Purpose
F	Stonehill Road, Chobham	Order Limits reduced.	Houses removed from Order Limits.
F	Windlesham Road	Pipe centreline switched to north side of the existing pipeline route for 80m. Order Limits expanded north.	To avoid private tennis court.
F	Stonehill Road, Chobham	Order limits expanded to include road.	To include option to not pass through private gardens.
F	North of Windlesham Road	Order Limits modifications to both lines south of option junctions.	To reduce the impact on field boundaries and private properties.
F	Holloway Hill, Runnymede	Crossing to north side of existing pipelines moved upstream by 280m.	Lake very close to existing pipelines (<3m). Design change reduces potential for impacts on the lake.
F	Steep Hill	Order Limits extended to edge of field boundary just north of Steep Hill.	To provide adequate flexibility to route around planned sand school for horse riding activities.
G	River Thames crossing	Option added to the east through Chertsey Meads and then before Local Nature Reserve (LNR), trenchless to small paddock south of B375.	To avoid wetland SSSI and LNR and possible SANG.
G	M3 Crossing	Trenchless options from land north of B375 to north of M3.	To reduce the extent of excavation works within areas of landfill.
G	East of M25	Move haul road to north.	To avoid woodland block.
G	M3 crossing	Alternative trenchless alignment added.	Avoids traveller site.
G	Old Littleton Road	Order Limits moved west by 35m over a length of 200m.	Earlier alignment would have been through the traveller site.
G	Old Littleton Road	Widening of Order Limits to west over a length of 180m.	To allow for alignment to be moved away from road.
H	West Close Ashford	Route into West Close altered.	Avoidance of back gardens and allotments.

Section	Area/Location	Embedded Mitigation	Purpose
H	Ashford railway crossing	Order Limits expanded southwards.	To reduce open cut trenching within the playing fields of St James Senior Boys School.
H	South of Ashford Station	Alternative alignment added to support trenchless crossings to west of station.	To avoid open cut trenching within the grounds of St James Senior Boys School.
H	A30 crossing	Minor adjustment to trenchless crossing alignments.	Clearance from existing pipes for crossing construction pits on south side of A30.
H	St James Senior Boys School	Adjustment to Order Limits around school playing field.	To exclude tennis courts and lake banks from Order Limits.
H	North of Ashford Station	Alternative alignment added for trenchless crossing options.	To support trenchless crossing at station car park.
H	North of Ashford Station	Alternative alignment added for trenchless crossing options.	To support trenchless crossings to west of station.

Good Practice Mitigation During Construction

4.7.8 This section provides an overview of good practice mitigation designed to prevent, reduce and offset potentially significant adverse effects that remain after embedded mitigation has been incorporated into the design. Each of the sub-sections within this section describes the good practice mitigation being relied upon during construction for the particular topic area that it covers. The Scoping Report assumes that relevant good practice measures will be included in the design and documentation submitted with the development consent application submission, and that they will be implemented. Should ongoing design development require a material change to the assumed mitigation, then the scoping process would be revisited to ensure robust EIA is undertaken. Should this occur, it would be fully reported in the ES.

4.7.9 The good practice mitigation to be relied upon during construction will be referred to in the ES and REAC to be submitted with the application for development consent. The Code of Construction Practice (CoCP) will be the principal mechanism that will apply and implement this good practice mitigation to the construction phase of the project. The CoCP will be developed further, in line with the design development and the EIA process. A suitably refined version will then be submitted with the ES in support of the application for development consent and will be considered within the Examination Phase of the development consent application. Compliance with the agreed CoCP will be secured by a requirement within the development consent.

4.7.10 The CoCP (an outline of which accompanies this Scoping Report in Appendix 1) will take into account relevant industry good practice standards for the contractor to implement during construction. Along with the REAC it will form the basis of the contractors' Construction Environmental Management Plan (CEMP).

Consultation and Community Engagement

4.7.11 The contractor will be required to prepare a Community Engagement Plan. This will ensure that the local community including organisations and businesses are given adequate information about construction activities in their area.

General Site Operations

Working hours

4.7.12 The CEMP, to be produced by the contractor, will require adherence to working hours of 07:00 to 19:00 Mondays to Saturday with exceptions such as —

- night-time working, e.g. the continuous pulling phase for a major crossing using HDD;
- any oversize deliveries or deliveries where daytime working would be excessively disruptive to normal traffic operation;
- overnight traffic management measures; and
- as otherwise agreed by the local authority in advance.

Lighting

4.7.13 Site compounds, storage areas and specific work areas may require lighting to ensure safety and security, especially in the winter months. Where night working is required continuous lighting will also be required. Lighting will be of the minimum luminosity necessary for each task. It will be designed, positioned and directed, so as to reduce the intrusion into adjacent properties and habitats. This will prevent

unnecessary disturbance to local residents, wildlife, railway operations and passing motorists.

4.7.14 Relevant guidance on mitigating the impact of artificial lighting on bats will be applied where practicable (see Biodiversity Section).

Fencing/security

4.7.15 The working areas will be appropriately fenced. The types of fencing required will depend on assessment of local livestock, trespass and security risks. The choice of fencing will be decided following a risk assessment, relevant to the work location. Such risk assessments may also result in the requirement for other security measures such as further lighting, security guards or CCTV. For some locations the fence used may also serve to provide acoustic and visual screening of the work sites to reduce the potential for disturbance of users in the surrounding areas. Provision of additional specialist fencing may also be required on a site by site basis to protect wildlife, trees, views or reduce noise effects.

Avoidance of nuisance and incidents

4.7.16 To reduce the risk of nuisance or environmental incident, appropriate housekeeping measures would be implemented by the contractor at all construction sites. These may include:

- Preventative pest and vermin control and prompt treatment of any infestation. This would include arrangements for the proper storage and disposal of waste produced on site;
- Inspection and collection of any waste or litter found on site;
- No intentional discharge of site runoff to ditches, watercourses, drains or sewers without appropriate treatment and agreement of the appropriate authority (except in the case of an emergency);
- Site offices and welfare facilities to be located so as to avoid overlooking residential properties;
- Designated smoking/vaping areas to be located, so as not to cause significant nuisance to neighbours;
- Management of staff/vehicles entering or leaving site, especially at the beginning and end of the working day;
- Avoidance of use of loudspeaker systems or playing of radios;
- The location of any activity or equipment that may produce dust and exhaust emissions, away from residential property where possible. Such equipment would typically include mobile plant and generators; and
- Management of potential off site contractor and visitor parking to reduce impacts on residential areas.

Pollution Prevention

4.7.17 The CEMP produced by the contractor will outline the actions and measures that should be implemented to control the risk of a pollution incident. This could be either directly from the construction works or due to external factors such as extreme weather. Measures that should be implemented to reduce the risk of a pollution incident occurring will be included such as appropriate storage and handling of fuels and other substances hazardous to the environment. The CEMP will include pro-

active actions to ensure that any pollution incident is controlled and managed effectively to mitigate any adverse impacts on the environment.

Biodiversity

4.7.18 The scoping of biodiversity has been based on the following good practice mitigation measures. All measures will be controlled using the REAC and CEMP (produced by the contractor). This will include the design, specification and monitoring of all reinstatement and mitigation.

4.7.19 Pre-construction surveys will be undertaken to inform the construction phase and these will be used to revise the CEMP.

4.7.20 Working widths will be reduced to only utilise a 10m width when crossing through boundaries where these include hedgerows, trees or watercourses. Working widths will be reduced where possible where trees are present.

4.7.21 To reduce the ecological impacts, where possible, specific works at particularly sensitive times of year will be managed by implementing the following measures:

- Hedges and scrub with the potential to support bird nests will ideally be removed between September to March inclusive. This is outside of the breeding bird season. Where this is not possible any clearance works will be carried out under the supervision of the Environmental Clerk of Works (ECoW).
- Habitats with the potential to support hibernating species will not be removed during the hibernation season if possible. If removal becomes necessary, it will be undertaken under the supervision of an ECoW or after appropriate mitigation has been completed.
- All site preparation and construction works within the Thames Basin Heaths SPA will ideally be undertaken between 1st October and 31st January. This is because outside these times disturbance to the breeding bird qualifying species would be possible. Where it becomes necessary to undertake works during the breeding season, such works will be carried out under the supervision of the ECoW and in agreement with Natural England.
- Open cut crossings of watercourses will be undertaken in periods of reduced flow to reduce flood risk when practical. Where watercourses are known to support migratory salmonids or eel, timing and method of the works would be agreed with local EA fisheries officers on a watercourse specific basis.
- Licences will be secured from Natural England for works where necessary under relevant wildlife legislation. All construction works will be undertaken in accordance with the relevant mitigation strategies and conditions of those licences. Draft licence applications will be provided in support of the application for development consent. The content of the draft licence applications would inform any ‘Letter of No Impediment’ (LONI) from Natural England.

4.7.22 Standard good practice mitigation will be implemented where appropriate to reduce the risk of harm to protected or notable species that are not subject to licensing. Examples include reptiles or notable mammals. This mitigation will include measures such as habitat manipulation (i.e. strimming vegetation to a lower height to encourage animals to disperse), trapping and translocation, or fingertip searching, where appropriate.

4.7.23 Measures to prevent or control the spread of invasive non-native species will be included in the REAC. This would control the risk of spreading legally controlled species. It would also contribute to the protection of sensitive habitats and species, for example those found in statutory and non-statutory designated wildlife sites.

4.7.24 If necessary, the contractor will undertake post construction monitoring of species translocations, habitat creation/restoration and work undertaken as part of a protected species licence. The purpose of the monitoring will be to assess efficacy of any mitigation provided. This will be undertaken for the duration either specified in the relevant protected species licence or in the REAC. Compliance with the REAC will be secured through the Development Consent Order and monitored on site by Esso.

4.7.25 Relevant guidance on mitigating the impact of artificial lighting on bats will be applied where practicable (for example that published by the Bat Conservation Trust, 2014). This would include good practice measures such as avoiding direct illumination of bat roosts and limiting times that the lights are on and consideration of factors such as height of lighting columns and use of light sources with minimal UV.

Water and Drainage

4.7.26 The CEMP will set out the water mitigation and management measures and where they will need to be used. These measures will include, but not be restricted to, the following:

- details of where and when de-watering is likely to be required;
- measures to segregate construction site runoff from natural catchment runoff;
- the location and design of any holding or settlement lagoons or other treatment system required prior to discharge to the environment;
- the location of any known land drainage systems likely to be impacted, the design for header drains and the location of any discharge points;
- details of mitigation measures for all work or compound areas located within flood risk areas;
- construction activities to be located outside of the floodplain as much as possible (i.e. avoid stockpiling materials in the floodplain);
- where necessary, measures to mitigate for any flood waters displaced during temporary construction works may be required. This could include measures such as raised storage areas, cabins etc;
- attenuation of increased runoff rates prior to discharge at controlled rates to receiving watercourses; and
- details of any water abstraction and discharge points relating to the hydrostatic testing of the pipeline.

Historic Environment

4.7.27 The contractor will implement appropriate measures to reduce impacts upon heritage and archaeological features. This includes both known features and those that may be discovered during the construction phase. Where such features cannot be avoided, other mitigation measures will be implemented.

4.7.28 An Archaeological Mitigation Strategy and Written Scheme of Investigation will identify what further archaeological investigation and mitigation is required during the

construction phase.

Landscape and Visual, including Trees

Landscape and Visual

4.7.29 The contractor will use appropriate measures to mitigate the landscape and visual impacts of construction on the landscape. These measures will be included in the REAC and will include the design, specification and monitoring of all reinstatement and mitigation planting.

4.7.30 Above ground features will be secured with suitable fencing. To reduce the loss of characteristic landscape features the contractor will retain existing vegetation wherever possible.

Trees

4.7.31 Wherever practicable, the contractor will adhere to the guidelines for working near trees contained within the National Joint Utilities Group Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees (NJUG Volume 4).

4.7.32 The risk to root systems and tree canopies of retained trees, from vehicle and plant movements, will be reduced by the use of appropriate tree protection fencing as specified in BS5837:2012 'Trees in relation to design, demolition and construction – Recommendations' (or similar and approved). Where this is not practical, other measures such as 'bog mats', 'trackway' or 'sand pads' would be used to reduce root damage due to soil compaction.

4.7.33 Compounds, equipment and material storage will be kept an appropriate distance from nearby trees based on Root Protection Area (as calculated using NJUG guidance).

4.7.34 Potential impacts on trees or other mature vegetation will be considered when positioning site access and exit points.

4.7.35 To ensure appropriate tree protection, the contractor will produce an Arboricultural Method Statement and Tree Protection Plan (as referenced within BS5837:2012) to highlight the tree protection measures to be adopted.

4.7.36 The ECoW will ensure the appropriate measures identified within the Arboricultural Method Statement are implemented pre construction and maintained during the construction phase.

4.7.37 Following the construction phase ground reinstatement may include but not be limited to soil de-compaction and remedial tree pruning along with a period of tree monitoring.

Waste and Contamination

Waste

4.7.38 The contractor will outline measures to be taken to reduce the volume of waste produced and apply the waste hierarchy. All measures will be controlled using the REAC and CEMP (produced by the contractor).

4.7.39 The contractor will also set waste targets for the Project. The quantities of waste produced will be recorded and monitored against those targets. The contractor will aim to maximise the amount of waste that is subjected to recycling or re-use.

4.7.40 All waste types that are likely to be produced by the construction works will be identified, along with estimated volumes and proposed disposal methods. This will be updated throughout the construction phase.

4.7.41 The contractor will record all movements of waste off site, which will be undertaken by an appropriately licenced carrier.

4.7.42 The contractor will ensure that any potentially hazardous waste is correctly stored, tested, recorded and disposed of. This may include asphalt from roads that contains coal tar.

4.7.43 A system of segregating waste will be established on site to reduce cross contamination. Waste containers will be appropriate and designed to prevent leachate or waste escaping due to wind or rain.

Contamination

4.7.44 The contractor will be made aware of any known sites which have confirmed or potential contamination. These, plus any unknown contamination that may be encountered, will be managed through the implementation of standard brownfield good practice and working methods. These will mitigate the potential effects of contamination and will include measures such as:

- a watching brief and agreed actions in case of unexpected ground conditions;
- avoidance of direct worker exposure to soil;
- reduction of dust generation;
- stockpile potentially contaminated materials separately from natural soils; and
- appropriately dispose of ground arisings deemed unsuitable for re-use within the Project.

4.7.45 Where the route passes through areas where there are active Environmental Permits (for example authorised landfill sites), the contractor will work with the permit holder to comply with the permit requirements. This could include modification of the permit as required to allow the works to proceed.

Land Use, Minerals and Soils

4.7.46 Construction works will be carried out in a manner to reduce disturbance to agricultural operations and other land uses.

4.7.47 General good practice controls and procedures will be implemented to mitigate potential avoidable impacts on Land Use aspects, including maintaining access.

4.7.48 The Mineral Planning Authority and relevant stakeholders will be engaged with to mitigate the loss of any mineral resources identified as significant. Mitigation could include prior extraction of mineral resources and sensitive working methods. These would mitigate impact on adjacent land that may be worked for minerals now or in the future.

4.7.49 The contractor will implement appropriate measures in line with Defra Code of Practice for the sustainable use of soils on construction sites. This could include measures such as:

- strip soils when in a reasonably dry state;
- store different soil types separately;
- store soil close to where it was excavated;
- limit the height and duration of soil stockpiles; and
- employ a Suitably Qualified Environmental Professional to carry out a watching brief.

4.7.50 The need for any bespoke soil management strategy will be included in the REAC if required. This will ensure the appropriate handling, storage and reinstatement of soils within sensitive ecological sites, e.g. statutory and non-statutory wildlife sites.

4.7.51 A method statement will be produced for stripping, handling, storage and replacement of all soils to reduce risks associated with soil degradation. This will include any remediation measures necessary following completion of works.

Air Quality

4.7.52 The contractor would be required to reduce the release of airborne pollutants during construction as far as reasonably practicable. A Construction Traffic Management Plan (CTMP) would be put in place. This would include measures to manage the flow of heavy duty vehicles (HDVs) through Air Quality Management Areas (AQMAs) so that the air quality effects of the Project would be mitigated. The increase in HDVs should be less than 25 as an annual average daily total on any single road link within the AQMA.

4.7.53 Pollutants such as dust and nitrogen dioxide could be generated by construction plant and vehicles. The contractor would undertake and implement the following management and control measures.

- Provide general site management and good housekeeping procedures, including:
  - name and contact details for air and dust issues displayed on site boundary;
  - plan the site layouts so that machinery and dust-generating activities are located as far as practicable from nearby receptors, such as residential properties; and
  - appropriate training of the construction workers to increase awareness of dust management and control measures.
- Record all dust and air quality complaints and any exceptional incidents, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken. The complaints and incidents log would be available to the local authorities.
- Implement a dust management plan, which could include the following measures to control or mitigate potential adverse impacts caused by the construction works:
  - control runoff of water or mud to reduce spread of particulates that could subsequently be disturbed and become airborne;
  - return subsoil and topsoil at the earliest suitable time of year;
  - manage earthworks and exposed areas or soil stockpiles to prevent wind whipping. Use methods such as covering, re-vegetating or using water suppression;

- signpost a maximum speed limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas;
- where there is a risk of dust nuisance, use cutting, grinding or sawing equipment fitted, or in conjunction, with suitable dust suppression techniques;
- ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation;
- where there is a risk of dust nuisance, use enclosed chutes and conveyors and covered skips;
- when loading/unloading vehicles, drop heights must be kept to a minimum;
- ensure equipment is readily available on site to clean any dry spillages. Clean up spillages as soon as reasonably practicable after the event using wet cleaning methods;
- dry sweeping of large areas should be avoided;
- no bonfires or the burning of waste materials;
- avoid scabbling (roughening of concrete surfaces) where possible;
- ensure sand and other aggregates are not allowed to dry out. If drying out is required for a particular process, ensure that appropriate additional control measures are in place;
- water assisted road sweepers should be deployed on public roads when necessary. This is to prevent excessive dust or mud deposits;
- sheet vehicle loads during the transportation of loose or potentially dusty material or spoil; and
- adequate wheel washing facilities should be provided at access points on to the public highway.

4.7.54 Measures to reduce the impacts from plant and vehicles would include, but not limited to:

- Vehicles to switch off engines when not in use and it is safe to do so;
- Avoidance of the use of generators and using mains electricity or battery-powered equipment where practicable;
- Plan compound layouts so that machinery is located as far away from sensitive receptors as practicably possible; and
- Ensure that plant and vehicles are well maintained and operated in accordance with manufacturer's recommendations.

4.7.55 Dust and air pollution monitoring measures would be implemented during the construction phase, which would include the following.

- Undertake on-site and off-site inspection to monitor dust. Inspection results to be recorded in a log. The log would be available to view by the local authority if asked. This would include dust soiling checks of surfaces. For example, checking of street furniture, cars and flat surfaces around the site boundary.
- Carry out site inspections to monitor compliance with the CEMP and record inspection results. The inspection log would be available to the local authority

when asked. The frequency of inspections would be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

- Develop action plans and contingency plans for adverse weather conditions and rapid response to the breakdown of dust suppression equipment.

Noise and Vibration

4.7.56 Contractors will be required to submit applications for Section 61 consents, variations and dispensations under the Control of Pollution Act 1974 (CoPA) for all construction activities that may generate a significant noise and/or vibration effect, including activities to be undertaken outside of core working hours, unless otherwise agreed with the relevant planning authority. Activities that typically do not require a Section 61 consent include those which do not have significant noise and vibration impact, and would occur during core working hours, such as pipe welding.

4.7.57 Each Section 61 application would include the following details in relation to the Project within the relevant local authority area:

- scheme of work;
- programme;
- working hours;
- plant noise data;
- best practicable means (BPM) measures (as defined in Section 72 of CoPA 1974 and Section 79 of the Environmental Protection Act 1990);
- predicted noise and vibration levels; and
- BPM justification for short term higher noise/vibration operations or out of hours working.

4.7.58 Noise and vibration will be managed by processes and measures laid out in the CEMP, which will include the following:

- BPM to be generally adopted for the control of noise and vibration across the Project;
- confirm the personnel who will apply for Section 61, together with their qualifications and experience;
- establish a communications protocol to communicate with local authorities; and
- establish an enquiries and complaints procedure.

Traffic Management and Public Access

4.7.59 The contractor will produce a CTMP with the local authorities and the emergency services. The contractor would then implement measures within the CTMP to reduce the traffic disruption to local people and users of the transport network due to increased traffic level generated by the Project. The contractor will also implement measures to reduce the disruption to users of PRoWs.

4.7.60 The contractor will consider the traffic generated by construction vehicles and how to manage the diversions and closures within the highway network (provided for under the development consent). The CTMP could also include, but not be limited to, the following:

- locate main temporary construction compound(s) route and site boundaries, access/egress points and temporary construction sites;
- Routes to be taken by heavy duty vehicles (HDVs), light duty vehicles (LDVs) and other site traffic would be defined;
- known delivery times;
- detail each road crossing including the technique for installing the pipeline, access points and traffic management requirements;
- locate temporary road closures including temporary diversion routes agreed with the relevant highway authority;
- provide proof of concept for the proposed measures, for example large vehicle swept path analysis at pinch points on the public highway;
- present the approach to management of construction worker travel movements both at the start and end of shifts and during the working day;
- provide measures for the monitoring of the CTMP and details of appropriate actions in the event of a non-compliance;
- provide a Travel Plan for transport of the construction workforce to include for lift share with a minimum of two workers per vehicle on average; and
- measures to ensure safe access to and from site.

4.7.61 The contractor will ensure that HDV drivers are aware of designated access routes. The contractor will also ensure that appropriate temporary signage is in place directing HDV drivers to relevant construction sites/compounds.

4.7.62 The contractor will ensure that vehicle washing facilities are available at the main temporary site compounds.

4.7.63 All PRoWs including, National Trails, crossing the working area will be managed and access will only be closed for short periods while construction activities occur. Powers for temporary diversions and stopping up of PRoWs will be contained within the Development Consent Order.

Good Practice Mitigation During Operation

4.7.64 The replacement pipeline will be operated in accordance with good practice and regulatory requirements. Good practice mitigation during operation of the replacement pipeline would include the use of appropriately designed systems to:

- contain fuel and wastes drained from the pipeline during inspections (prior to removal from site for treatment and disposal); and
- treat runoff from hard standings prior to discharge to the environment.

Good Practice Mitigation During Decommissioning

4.7.65 When the pipeline operator determines that it will permanently cease pipeline operations, it will consider and implement an appropriate decommissioning strategy taking account of good industry practice, its obligations to landowners under the relevant pipeline deeds and all relevant statutory requirements.

Consents, Permits and Licences

4.7.66 In addition to the embedded and good practice mitigation identified and any other provisions within the development consent, the contractor will need to comply with all relevant legislation. Where appropriate, consents and permits will be included within the application for development consent.

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Chapter 5
Consultation and Engagement

Scoping Report Volume 1

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5. Consultation and Engagement

5.1 Introduction

5.1.1 This Chapter sets out the approach to consultation and engagement with the public, communities, statutory and non-statutory organisations. It includes a summary of the work that has been undertaken to date in relation to the potential environmental effects of the Project. The consultation and engagement process going forward is presented within Chapter 17 Next Steps.

5.1.2 Engagement is a continual process of ongoing dialogue with individuals, communities and organisations about the Project. It is used to ensure that there is an ongoing exchange of information and continual sharing of knowledge and insight between the Project team and relevant stakeholders.

5.1.3 Consultation is a more defined process, which includes presenting proposals, holding exhibitions and having two-way interactions with individuals, communities and organisations at specific times during the Project's development on a specific proposal or options. Consultation aims to achieve a fair dialogue based upon an exchange of views and enables stakeholders to formally comment on the Project design and decisions.

5.2 Engagement to date

5.2.1 The Project has engaged with a wide range of national and local environmental organisations, local authorities, other local groups and individual landowners. The purpose of this has been to inform parties about the Project. It has also helped to identify issues and concerns relevant to stakeholders regarding the Project, its design and the EIA process.

5.2.2 Engagement with these parties has also allowed the Project to gain information that has fed into the ongoing design. This will help to reduce potential effects on the community and the environment during construction, operation and decommissioning of the pipeline.

5.2.3 Table 5.1 lists the engagement meetings and discussions that have taken place to date with specific stakeholders on particular environmental issues. Further meetings will be held with these and other stakeholders during the Project design, as set out in Chapter 17 – Next Steps.

Table 5.1 Environmental stakeholder meetings and discussions

Stakeholder	Topic of discussion	Date of meeting / discussion
Planning Inspectorate	Introduction to the Project, DCO process, EIA, other consents, consultation.	08/12/17
	Update on project.	06/06/18
National Trust	Introduction to the Project, corridor options appraisal process, environmental issues.	19/02/18
South Downs National Park Authority	Introduction to the Project, corridor options appraisal process, environmental issues	13/12/17
	Environmental, ecological and landscape constraints and mitigation approaches in corridors	29/01/18
	Corridor consultation, environmental issues	30/04/18
	Landscape issues: Proportionate assessment; scope, baseline, representative viewpoints and mitigation; Landscape and visual effects considering woodland, hedgerows and other landscape characteristics.	15/05/18
	Ecology and soils issues: SDNPA's initial thoughts and key areas of interest; Proposed scope of assessment; Potential mitigation options	16/05/18
	Project update, Initial Working route announcement, Environmental assessment update.	27/06/18

Stakeholder	Topic of discussion	Date of meeting / discussion
Natural England	Introductions and scheme overview; environmental constraints and corridor appraisal; timescales and how the Project will consult with the agencies going forward (with Environment Agency and Historic England).	07/02/18
	Ecology – corridor consultation, survey strategy, designated sites, Habitats Regulations Assessment	21/03/18
	Ecology – discussion on protected species surveys	20/04/18
	Project update, Initial working route announcement, Environmental assessment update (with Environment Agency).	14/06/18
Environment Agency	Introductions and scheme overview; environmental constraints and corridor appraisal; timescales and how the Project will consult with the agencies going forward (with Natural England and Historic England).	07/02/18
	Update on the Project; corridor consultation, survey strategy; groundwater, land quality and water quality	09/04/18
	Flood risks, aquatic ecology, watercourse crossing principles, Water Framework Directive assessment.	17/05/18
	Project update, Initial working route announcement, Environmental assessment update (with Natural England).	14/06/18
	Groundwater and land quality issues; Initial working route, design, data, Scoping and key issues.	09/07/18
Historic England	Introductions and scheme overview; environmental constraints and corridor appraisal; timescales and how the Project will consult with the agencies going forward (with Environment Agency and Natural England).	07/02/18
	Project update, Initial working route announcement, Environmental assessment update.	21/06/18

Stakeholder	Topic of discussion	Date of meeting / discussion
Forestry Commission	Corridor consultation, forestry impacts	01/04/18
	Project update	19/04/18
Hampshire County Council, Winchester City Council Archaeologists	Corridor consultation, heritage assessment, survey strategy and mitigation approaches	18/04/18
Surrey County Council Archaeologist	Corridor consultation, heritage assessment, survey strategy and mitigation approaches	26/04/18
Surrey Wildlife Trust	Corridor consultation, ecological impacts, designated sites under SWT management, survey strategy	01/05/18
East Hampshire, Winchester and Hart Councils' Ecologists	Corridor consultation, ecological impacts, survey strategy	03/05/18
Portsmouth Water	Updating on Project background and information; Pipeline design and integrity; Environmental assessment: Data request, and approach to assessment	07/06/18

5.2.4 Meetings have also been held with a wider group of interested parties (Table 5.2). These have been to explain the Project, understand issues and obtain feedback useful to the preferred corridor selection and route development, and feed into the design, planning context and EIA.

5.2.5 Meetings have also been arranged and held with landowners who may be affected by the route, including individual meetings together with a series of invitation-only events along the route in July 2018.

Table 5.2 Other stakeholder meetings and discussions

Stakeholder	Date of meeting
Surrey County Council Members Forum Surrey County Council Officers Forum Hampshire County Council Members Forum Hampshire County Council Officers Forum	19/01/18
Surrey County Council Members Forum Surrey County Council Officers Forum	23/02/18

Stakeholder	Date of meeting
Hampshire County Council Members Forum	
Basingstoke Canal Authority	13/02/18
Network Rail	20/02/18
Country Landowners Association (CLA)	06/03/18
East Hampshire District Council	07/03/18
Guildford Borough Council	12/03/18
Runnymede Borough Council	13/03/18
	03/07/18
Woking Borough Council	20/03/18
Highways England	26/03/18
Worplesdon Parish Council	04/04/18
Briefing with Chobham groups	05/04/18
Holybourne Village Association	10/04/18
National Farmers Union	16/04/18
Frimley Fuel Allotments Society	16/04/18
Bentley Parish Council	16/04/18
Surrey County Council Highways	19/04/18
Farnham Town Council	23/04/18
Hampshire CLA (membership organisation for owners of rural land, property and businesses) members' presentation, East Tisted	25/04/18
Waverley Borough Council	30/04/18
Surrey County Council Members Forum Surrey County Council Officers Forum Hampshire County Council Members Forum	25/05/18

Stakeholder	Date of meeting
Hampshire County Council Officers Forum	
Hampshire County Council Highways	07/06/18
Spelthorne District Council	15/06/18
Parish Council Drop-in: Alton Community Centre	20/06/18
Parish Council Drop-in: Bishop's Waltham	21/06/18
Surrey County Council Highways meeting #2	21/06/18
Chobham Parish Council	27/06/18
Surrey Heath Borough Council	27/06/18
Parish Council Drop-in: Windlesham	29/06/18
Rushmoor Borough Council	05/07/18

5.3 Consultation

5.3.1 There is a legal requirement to undertake a consultation ahead of the development consent application to the Planning Inspectorate. This can be referred to as the statutory consultation.

5.3.2 The Planning Inspectorate also recommend undertaking an earlier 'options' consultation to make sure the views of individuals, communities and organisations are considered at a formative stage of a project's development (Planning Inspectorate, 2017, Advice Note 7 paragraph 4.8). This can be referred to as a non-statutory consultation.

Replacement Pipeline Corridor Consultation (Non-statutory)

5.3.3 The first public consultation was undertaken between 19 March and 30 April 2018 to help select a preferred corridor for the replacement pipeline. The consultation corridor options are described in Chapter 4: Design Evolution.

5.3.4 Materials were produced to help people understand the Project and proposed corridors. These included a brochure, summary leaflet and map book. These were available in hard copy and on-line. The Project website (www.slpproject.co.uk) was updated to include a specific webpage on the consultation. Consultation materials were made available at the consultation events and at over 100 information points along the proposed corridors, such as public libraries.

5.3.5 A series of consultation events were held in or near to all the proposed corridors. This was to enable local communities and interested parties to meet the Project team and discuss the proposed corridor options. The consultation and events were publicised through adverts in key local publications, a press release shared with local editors to encourage news coverage, posters and materials sent to local deposit points, and engagement with local authorities. Local media, including BBC TV local news, also covered the consultation. All information was provided on the Project's website.

5.3.6 Table 5.3 gives the date and location of the consultation events and the number of people which attended each event. All weekday events were open from 2pm to 8pm. The Saturday event was open from 11am to 5pm.

Table 5.3 Corridor consultation events

Date	Location	Venue	Attendees
Tuesday 27 March	Byfleet	St Mary's Centre for the Community, Stream Close, Byfleet, Surrey	259
Thursday 29 March	Alton	Alton Community Centre, Amery Street, Alton, Hampshire	140
Tuesday 3 April	Ashford	Ashford Community Centre, Woodthorpe Road, Ashford, Middlesex	215
Friday 6 April	Chobham	Chobham Village Hall, Station Road, Chobham, Surrey	166
Saturday 7	Wrecclesham	The Wrecclesham Community	136

Date	Location	Venue	Attendees
April		Centre, Greenfield Road, Wrecclesham, Farnham, Surrey	
Monday 9 April	Addlestone and Chertsey	Chertsey Hall, Heriot Road, Chertsey, Surrey	144
Tuesday 10 April	Frimley	Lakeside Country Club, The Lakeside Complex, Wharf Road, Frimley Green, Surrey	512
Wednesday 11 April	Ropley	Ropley Parish Hall, Vicarage Lane, Ropley, Alresford, Hampshire	75
Thursday 12 April	Worplesdon	Worplesdon Memorial Hall, Perry Hill, Worplesdon, Guildford, Surrey	169
Wednesday 18 April	Church Crookham	Church Crookham Baptist Church, 64 Basingbourne Road, Fleet, Hampshire	82
Friday 20 April	Bishop's Waltham	Jubilee Hall, Little Shore Lane, Bishop's Waltham, Hampshire	55

5.3.7 A total of 1068 responses to the corridor consultation have been received to date. After the consultation closed on 30 April an independent consultation expert collated and analysed all consultation responses.

5.3.8 The consultation report will be published on the Project website and is available at www.slpproject.co.uk.

5.3.9 The preferred corridor was selected following a detailed and thorough review by the Project's senior management team. The team included expert support from our environmental, engineering and planning teams. The team was presented with the independent report on the consultation findings which included comments relating to the selection of a corridor. This was combined with technical data to help Esso select the preferred corridor. The main positives and negatives of each corridor and reasons for selection or deselection are presented within Chapter 4: Design Evolution.

5.3.10 Corridor option G in the south and corridor option J in the north were identified as the preferred corridor (please see Chapter 4 - Design Evolution, for description of options G and J). These corridors performed best when measured against the guiding principles set for the Project. When the two selected options are combined they form the single preferred corridor.

5.3.11 Although the aim of the consultation was to receive views on which corridor to progress, we also received information relevant to routes within the corridors. This early feedback has been incorporated into our current design development. This is summarised in Table 5.4.

Table 5.4 Actions as a result of consultation comments

Location	Comments
Frimley Park Hospital sub-option	This sub-option that passes the hospital has been removed. This is due to concerns around traffic management in this busy area and obstruction to emergency services.
Chobham Common sub-option	Feedback from the corridor options consultation about this sub-option has been noted. Respondents were concerned about the potential effect on Chobham residents and properties. More technical work needs to be completed before this sub-option can be removed.
Queen Mary Reservoir sub-option	Feedback from the corridor options consultation about this sub-option has been noted. Respondents were concerned about traffic management in Laleham and a limited number of feasible routes in this area. More technical work needs to be completed before this sub-option can be removed.
Working within designated areas and South Downs National Park	The Project is working with statutory and expert environmental organisations to develop the assessment and potential mitigation in these areas. The aim is to carefully design the pipeline to avoid or reduce environmental impacts.

5.4 Next Steps

5.4.1 Consultation and Engagement will continue through the pre-application work as described in Chapter 17 Next Steps.

Scoping consultation

5.4.2 As set out in Chapter 1, this Scoping Report accompanies a formal request for an EIA Scoping Opinion from the Planning Inspectorate. The Planning Inspectorate will consult statutory consultees such as Natural England, the Environment Agency and local authorities, before issuing their Scoping Opinion. The Project will carefully consider the Scoping Opinion and consultee responses during the EIA process.

Statutory consultation

5.4.3 The Planning Act 2008 requires that before submitting an application for development consent, applicants must carry out a pre-application Statutory Consultation on the proposals with certain prescribed consultees, local authorities and land owners as well as the wider local community.

5.4.4 Before undertaking the statutory consultation, a Statement of Community Consultation will be developed with the relevant local authorities and this will set out how the local community will be consulted.

5.4.5 The consultation is expected to largely follow the approach taken for the non-statutory corridor consultation, as detailed in Section 5.3.

5.4.6 Following the statutory consultation, a formal application for development consent to construct the pipeline will be submitted.

Chapter 6
Impact Assessment Methodology

Scoping Report Volume 1

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6. Impact Assessment Methodology

6.1 Assessment of Significance

6.1.1 This chapter describes the methodology which would be used to assess the potential significance of effects on the natural, human and built environment as a result of the Project.

6.1.2 The environmental impact assessment (EIA) is intended to be a receptor based assessment. Receptors are those aspects of the environment which are sensitive to change as a result of sources such as dust, noise and construction activities. The receptors form the chapter headings from 7 to 14 in the Scoping Report, and a similar approach will be followed for the Environmental Statement (ES). As with this Scoping Report, technical notes (for example on air quality, noise and vibration, traffic and transportation) will be appended to provide information on topics which are potential sources of impacts from the Project on environmental receptors.

6.1.3 The assessment of significance will be based on a three step process. The first step assigns sensitivity or inherent value to a receptor. Sensitivity is how easily the receptor is affected by change, and value is a measure of its inherent worth. Table 6.1 provides broad definitions of sensitivity or value. Each topic chapter will define the sensitivity or value of aspects specific to that topic.

Table 6.1 Sensitivity and value criteria

Value/sensitivity	General criteria
High	Of value, importance or rarity on an international or national scale, and with very limited potential for substitution; and/or Very sensitive to change, or has little capacity to accommodate a change
Medium	Of value, importance or rarity on a regional scale, and with limited potential for substitution; and/or Moderate sensitivity to change, or moderate capacity to accommodate a change.
Low	Of value, importance or rarity on a local scale; and/or Not particularly sensitive to change, or has considerable capacity to accommodate a change.
Negligible	Of value, importance or rarity on a very local scale; and/or Not sensitive to change, or has very considerable capacity to accommodate a change.

6.1.4 The second stage of the assessment will determine the likely magnitude of the potential impact. This is the scale of the change caused to the baseline conditions. The magnitude of assessment takes into consideration all embedded mitigation, good practice and measures included in the Code of Construction Practice (CoCP), the likely duration of the impact and how easily or quickly the change would be reversed.

6.1.5 Table 6.2 presents generalised magnitude criteria. These criteria will form the basis for the individual topic magnitude definitions and tailored to the topic area.

Table 6.2 Magnitude criteria

Magnitude	General criteria
Large	*Adverse*: Loss of resource or quality and integrity of resource; severe damage to key characteristics, features or elements; or *Beneficial*: Large scale or major improvement of resources quality; extensive restoration or enhancement; major improvement of attribute quality. Long or permanent duration of impact. Irreversible change.
Medium	*Adverse*: Loss of resource, but not adversely affecting its integrity; partial loss of or damage to key characteristics, features or elements; or *Beneficial:* Benefit to, or addition of, key characteristics, features or elements; improvements of attribute quality. Medium term duration of impact, not beyond the construction period. Change largely reversible
Small	*Adverse:* Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one or more key characteristic, feature or element; or *Beneficial:* Minor benefit to, or addition of, one or more key characteristic, feature or element; some beneficial effect on attribute or a reduced risk of negative effect occurring. Short term duration of impact. Easily reversible.
Negligible	*Adverse:* Very minor loss or detrimental alteration to one or more characteristic, feature or element; or *Beneficial:* Very minor benefit to, or positive addition of, one or more characteristic, feature or element.

6.1.6 The third stage of the assessment will allocate significance to an effect. There is no regulatory definition of significance, so each EIA is required to outline the Project's own definition of significance.

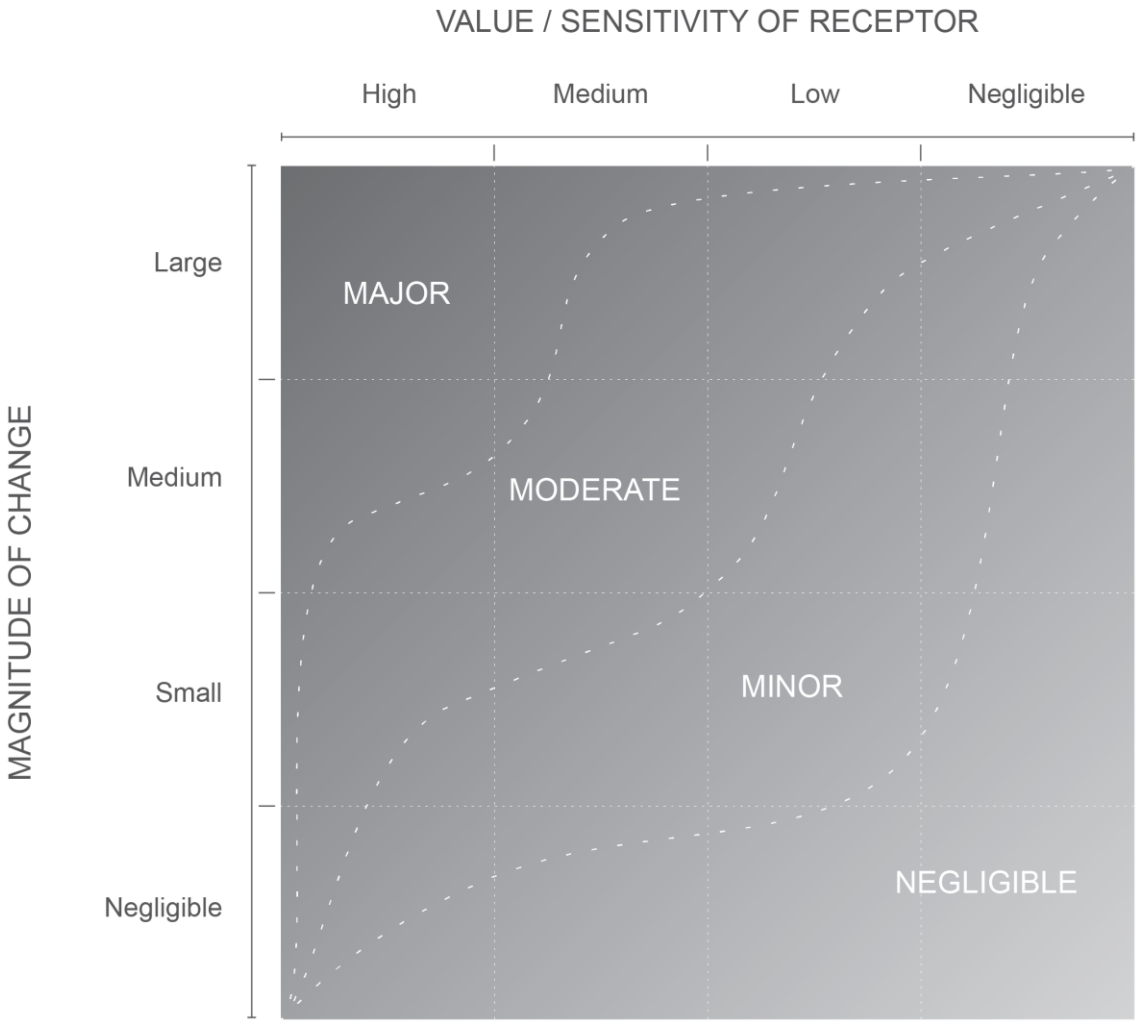
6.1.7 The sensitivity or value of the receptor will be considered in relation to the magnitude of the potential impact. A highly sensitive receptor subject to a large magnitude of change would suffer a significant alteration. A low sensitivity receptor with a small magnitude of change would not suffer a significant change.

6.1.8 The matrix shown in Figure 6.1 is used as the basis for assigning significance to an effect. It uses merging bands to reflect the role of professional judgement when allocating significance. This is of particular relevance for the Project, where the majority of the effects are likely to be short term and during construction.

6.1.9 The matrix allows appropriate consideration to be given to the influence of impact

duration on the overall significance of effect. Topic chapters will describe in full the assignment of significance.

Figure 6.1: Significance Matrix



6.1.10 Under the EIA Regulations (2017) and EU EIA Directive (2014) the significant effects of the project on the environment must be reported in the ES. Effects of minor or negligible significance are not considered to be significant effects on the environment.

6.2 Mitigation and enhancement

6.2.1 After initial consideration of the effects of the Project and their potential significance, consideration will be given as to how those effects could be avoided, reduced or remedied. This is known as mitigation. Mitigation measures will be detailed in advance of submission and become part of the application for development consent. There are three types of mitigation: primary, secondary and tertiary, as defined in IEMA's 2015 'EIA Guide to Shaping Quality Development'.

6.2.2 Primary mitigation measures: These are measures that are an essential part of design evolution (i.e. realignment of the pipeline route to avoid priority habitats). This is detailed within the Project description and design development chapters, and is referred to as Embedded Mitigation measures.

6.2.3 Secondary mitigation measures are further activities or measures that are required to be put in place to reduce the potential significant adverse effects of the Project. These will be detailed within the topic chapters of the ES and secured through DCO requirements and the Register of Environmental Actions and Commitments (REAC) . An example of secondary mitigation would be habitat replacement if construction works could not avoid a sensitive habitat.

6.2.4 Tertiary mitigation measures are measures which may be adopted, regardless of the EIA findings, because of wider legislative requirements or as part of standard sector practices. For example, implementing mitigation required by a European Protected Species Licence. These measures will be captured in the relevant project documents such as the CoCP or License requirements for protected species and will be referred to as Good Practice Mitigation.

6.2.5 In addition, enhancement measures may be proposed. These are deliberate attempts included in the design of the Project to ensure the success of a wider range of direct and indirect positive outcomes to the environment. These will be agreed by the Project in advance of submission, to improve the environment in the area affected by the Project but not implemented to mitigate for a specific significant effect. Enhancements will be outlined within the topic chapters of the ES. An example of an enhancement would be additional habitat creation.

6.2.6 Once mitigation and enhancement measures have been agreed, a further consideration of the significance of the effect will be carried out to assess the residual or remaining effects on the environmental receptors.

6.3 Monitoring

6.3.1 A strategy to monitor the effectiveness of the mitigation will be developed to align with the EIA Regulations. The 2017 EIA Regulations introduced a requirement for monitoring where likely significant effects have been identified. Clear monitoring requirements would become part of the consent.

6.3.2 The monitoring will be detailed within ES topic chapters with clear and proportionate objectives outlined for the monitoring. This will be accompanied with a timescale and indication of who would be responsible for the monitoring, together with an outline of the remedial actions to be undertaken should results be adverse.

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Chapter 7
Biodiversity

Scoping Report Volume 1

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7. Biodiversity

7.1 Introduction

7.1.1 This chapter on biodiversity considers habitats and species in both freshwater and terrestrial environments.

7.1.2 The Project has the potential to affect habitats and species of biodiversity value within the Project's zone of influence in both freshwater and terrestrial environments. Based on the current understanding of the baseline conditions, this chapter identifies those features that may be susceptible to significant effects and would be considered in the Environmental Impact Assessment (EIA).

7.1.3 The direct effects of pipeline construction projects are generally confined to the construction period. They are usually temporary, reversible and short-duration, although permanent effects can arise in specific circumstances (e.g. changes to hydrological processes). This chapter outlines all anticipated impact pathways associated with the Project to features of biodiversity value.

7.1.4 This chapter also identifies habitats and species that would not be included in the Environmental Statement (ES) but would still be considered to ensure compliance with relevant policy or legislation. Full justification for the 'scoping out' of these habitats and species from the ES is provided, as necessary.

7.1.5 This scoping process, and the proposed assessment methodology, has been undertaken with reference to guidance provided in the *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2016) (hereafter referred to as 'the CIEEM guidelines'). In this assessment, the term 'ecological receptor' will be used in preference to 'ecological feature' as is used in the CIEEM Guidelines. This is to provide consistency between different discipline chapters.

7.1.6 Chapter 7 Biodiversity was written by a technical expert in the field of ecology who is currently employed by Jacobs UK Ltd. He has over 15 years' experience as a professional ecologist, eight of which have been in the consultancy sector. He has spent three years in higher education academia. His qualifications are BSc (Hons) in Human and Physical Geography from the University of Reading, and a UCert in Biological Recording and Species Identification from the University of Birmingham. He is a Chartered Environmentalist and a Full member of the Chartered Institute of Ecology and Environmental Management.

7.2 Legal and Policy Requirements

Legislation

7.2.1 A summary of the legislation of greatest relevance to biodiversity is provided below:

- Conservation of Habitats and Species Regulations 2017 – these provide for the designation and protection of European designated sites and species, and the adoption of planning and other controls for the protection of European sites (e.g. Special Areas of Conservation (SAC) and Special Protection Areas (SPA)). The Regulations allow for the licensing of activities affecting certain species that would otherwise be illegal (e.g. bats, great crested newts *Triturus cristatus* and dormice *Muscardinus avellanarius*);
- The Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations 2016 – these Regulations set out a series of objectives for fluvial, lacustrine, groundwater, transitional and coastal water bodies. These include improving the water environment to achieve good/high status, maintaining existing good/high status and implementing mitigation to support the water environment at a catchment and water body scale;
- Wildlife and Countryside Act 1981 (as amended) – this Act allows for the designation of Sites of Special Scientific Interest (SSSIs) due to features of conservation interest related to flora, fauna, physiography or geology. The Act makes it an offence to kill, injure, take, possess or trade in many wild animal species and to pick, uproot, possess or trade in a number of wild plants;
- Countryside and Rights of Way Act 2000 – this Act provides for public access on foot to certain areas of land and increases measures for the management and protection of SSSIs;
- Salmon and Freshwater Fisheries Act 1975 (as amended) – the Act is aimed at the protection of freshwater fish, with a particularly strong focus on salmon and trout. It sets out activities that could constitute an offence including direct mortality, barriers to migration and degradation of habitats;
- Protection of Badgers Act 1992 – the Act lists offences relating to activities affecting the animals themselves and their setts;
- The Environmental Protection Act 1990 – the Act enforces waste management and control of emissions into the environment;
- Natural Environment and Rural Communities Act (NERCA) 2006 – Section 40 NERCA 2006 places a duty to conserve biodiversity on public authorities in England. Section 41 requires the Secretary of State to publish and maintain lists of species and types of habitats which are regarded by Natural England to be of "principal importance" for the purposes of conserving biodiversity in England;

7.2.2 Compliance with the legislation relating to the protection of species of fauna would be assessed in a Protected and Legally Controlled Species Compliance Report. This report would be provided as an appendix to the ES and would address all relevant legally protected and controlled species, regardless of whether these had been scoped in or out of the ES;

7.2.3 Consideration of the aquatic environment and the *Water Environment (Water*

Framework Directive) (England and Wales) (Amendment) Regulations 2016 is set out in Chapter 8 Water. A Water Framework Directive (WFD) Assessment will be provided in a separate report as part of the application for development consent. A draft is presented in Appendix 5;

7.2.4 The Project would be subject to a Habitats Regulations Assessment (HRA), as per the provisions of the *Conservation of Habitats and Species Regulations 2017*. A report to inform a Stage 1 (Screening) assessment is provided in Appendix 4 of this Scoping Report as part of early consultation with PINS as advised in Advice Note 10 and agreed at meetings with PINS held on 6th June 2018 and Natural England held on 14th June 2018. An updated draft HRA report will be provided to Natural England following receipt of their consultation response on the Scoping and further surveys and design development. A final HRA report will be provided alongside the application for development consent.

7.2.5 The *Hedgerows Regulations 1997* do not apply as the Project would only be taken forward if Orders under the DCO process are made. This means any hedgerow removal would be considered to be permitted work under regulation 6(1)(e) of the *Hedgerows Regulations 1997*. However, any hedgerows impacted by the route have been noted and detailed surveys are proposed at targeted locations where desk study and Phase 1 habitat assessments consider these necessary.

Policy

7.2.6 National and local planning policy relevant to biodiversity has been reviewed in relation to the Order Limits and is summarised below. Whilst EN-1 and EN-4 remain the prime decision making documents, where they do not provide guidance, the following may also be considered important and relevant guidance that may require consideration by the decision making authority. At this stage it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State and it is included for completeness to allow the Secretary of State to make such a determination.

- Overarching National Policy Statement for Energy (EN-1), notably paragraph 1.7.2 and section 5.3;
- National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4), notably section 2.21;
- National Planning Policy Framework (NPPF), notably paragraphs 99, 109, 117 and 118;
- Core Strategy & Development Management Policies 2011- 2028 (Surrey Heath Borough Council, 2012), notably CP14A *Biodiversity and Nature Conservation* and CP14B *European Sites;*
- Local Plan Saved Policies (Runnymede Borough Council, 2007), notably NE16 *Sites of International and National Nature Conservation Importance*, NE17 *Sites of Nature Conservation Importance within the County*, NE18 *Enhancement of Sites of Nature Conservation Importance* and NE20 *Species Protection;*
- Core Strategy and Policies Development Plan Document (Spelthorne Borough Council, 2009), notably EN8 *Protecting and Improving the Landscape and Biodiversity*;

- Rushmoor Plan – Planning for Rushmoor's Future – Core Strategy Adopted October 2011 (Rushmoor Borough Council, 2011), notably CP13 *Thames Basin Heaths Special Protection Area* and CP15 *Biodiversity;*
- East Hampshire District Local Plan: Joint Core Strategy – Adopted 2014 (East Hampshire District Council and South Downs National Park Authority, 2014), notably CP21 *Biodiversity* and CP22 *Internationally designated sites;*
- Winchester District Local Plan Part 1 – Joint Core Strategy – Core Policies (Winchester City Council, 2013), notably CP16 *Biodiversity;*
- Eastleigh Borough Local Plan 2001-2011 (Eastleigh Borough Council, 2001), notably policy 2 *Nature conservation*;
- Emerging Eastleigh Borough Local Plan 2016-2036 (Eastleigh Borough Council, 2017);
- South Downs Local Plan (South Downs National Park Authority, 2017a), notably Strategic Policy SD9: *Biodiversity and Geodiversity,* Strategic Policy SD10: *International Sites*, and Development Management Policy SD11: *Trees, Woodland and Hedgerows;*
- UK Post-2010 Biodiversity Framework (JNCC and Defra, 2012);
- Local Biodiversity Action Plans (LBAPs), including:
  - Surrey Nature Partnership Targets (SNP, undated);
  - Local Biodiversity Action Plan (LBAP) for Hampshire (Hampshire Biodiversity Partnership, 2000);
  - Rushmoor Biodiversity Action Plan 2009-2014 (Rushmoor Borough Council, 2009);
  - Biodiversity Action Plan for East Hampshire (East Hampshire Council, undated);
  - Winchester BAP – A local biodiversity action plan for the district of Winchester (Hampshire & Isle of Wight Wildlife Trust, 2005);
  - Wild about Eastleigh – A biodiversity action plan for the borough (Eastleigh Borough Council, 2002); and
  - Biodiversity Background Paper – South Downs Local Plan (South Downs NPA, 2017).
  - Biodiversity and Planning in Surrey (Surrey Nature Partnership, 2012).
- Biodiversity Opportunity Areas (BOA) adopted by the Surrey Nature Partnership (2014) and Hampshire County Council (2009);
- South Downs Nature Improvement Area (NIA) (Natural England, undated).

7.3 Baseline Conditions

7.3.1 Pipeline construction generally produces temporary and localised impacts. To reflect this, a desk-study involving the collection of existing records within a 1km radius from the Order Limits has been undertaken. This study area was extended for specific receptors (e.g. statutory designated sites downstream of watercourse crossings that are sensitive to hydrological change, or statutory designated sites notable for the presence of mobile species that may use habitats within the Order Limits).

7.3.2 The results of the desk-study have informed the requirement for field surveys. The area subject to field surveys has been defined by professional judgement (e.g. based on the habitat preferences of the target species), consultation and engagement responses, appropriate good practice guidelines, and the extent of the Project's anticipated zones of influence (see Table 7.5 for more detail relating to zones of influence).

7.3.3 Where seasonal restrictions have allowed, the baseline described below has been based on the results of field surveys.

7.3.4 In this assessment, the term 'value' will be used in preference to 'importance' as is used in the CIEEM Guidelines. This is to provide consistency in terminology between different discipline chapters within the ES.

7.3.5 The collection of baseline information has focussed on those receptors that are considered to be 'valuable' and where the Project could create an impact pathway from which the receptor could experience a significant effect (CIEEM, 2016). Within this section, each ecological receptor has been given a value using a scale of 'negligible', 'low', 'medium' and 'high'. Information relating to the criteria used to give a value to ecological receptors is provided in Section 7.5.

7.3.6 The baseline has been established using the following sources of information:

- Non-statutory designated sites and/or protected/notable habitats and species information (where available) from:
  - Hampshire Biodiversity Information Centre (HBIC);
  - Greenspace Information for Greater London (GiGL);
  - Hampshire Bat Group;
  - Surrey Amphibian and Reptile Group (SARG);
  - West Surrey Badger Group; and
  - Multi-Agency Geographic Information for the Countryside (MAGIC) for European Protected Species Mitigation licences.
- Publically available Ordnance Survey maps and aerial imagery;
- Specially commissioned high-resolution aerial photography and LiDAR information of the route corridor options;
- Statutory designated site information from Joint Nature Conservation Committee (JNCC);
- National inventory for Ancient Woodland (Forestry Commission, 2018);

- Priority Habitats Inventory (England) (Natural England, 2018);
- Annex I bird records for the Thames Basin Heaths Special Protection Area (SPA) (2 Jays Ecology, 2018);
- Relevant scientific literature and third party survey reports;
- Field data (gathered from ongoing 2018 surveys up until 25th May 2018):
  - ground-based tree roost inspections for bats;
  - great crested newt (GCN) Habitat Suitability Index assessments, eDNA, and population estimate surveys;
  - Phase 1 habitat surveys and botanical assessments; and
  - badgers.

7.3.7 Information has been requested but not yet received from the following data providers:

- Environment Agency (EA);
- Surrey Biodiversity Information Centre (SBIC); and
- Surrey Bat Group.

7.3.8 Further detailed field surveys and desk studies will be undertaken during 2018 to complete the baseline assessment. The results of the baseline assessments undertaken to date are summarised below. Information relating to the survey methodologies for field surveys is provided in Appendix 3.

Site description

7.3.9 A description of the landscape through which the route passes is provided in Chapter 10 Landscape and Visual Effects. A summary of the broad landscape characteristics and semi-natural habitats is provided below.

7.3.10 Within Sections A, B and C, between Boorley Green to beyond Alton, the landscape is that of well-wooded rolling hills with large arable fields and bounding hedgerows. Other semi-natural habitats along this part of the route are infrequent or of limited size with, for example, small areas of calcareous grassland and numerous small watercourses.

7.3.11 The landscape changes within Section D and Section F, between Church Crookham and the M25. The main land use is amenity and defence training, with many small mostly pastoral fields in the surrounding countryside. Residential areas are also more abundant, with the route navigating dense residential areas between more open areas of heathland, plantation woodland or recreational grassland (e.g. golf courses).

7.3.12 Within Sections G and H, north-east of the M25, the route passes through mainly urban and industrial areas. Semi-natural habitats are limited here to undeveloped parts of the River Thames floodplain and marginal habitats. In this area there are many large man-made waterbodies (reservoirs and flooded former mineral works), including several close to the route.

Designated sites

7.3.13 The locations of statutory and non-statutory designated sites within the study area

are shown on Figure 7.1. A summary of these sites is provided in the paragraphs below and in Table 7.1. Each site has been assigned a value using the criteria described in Table 7.4.

7.3.14 There is one Special Area of Conservation (SAC) that would be crossed by the route (Order Limits): Thursley, Ash, Pirbright and Chobham SAC. There is one SAC that has a possible hydrological (water) connection to the route: Solent Maritime SAC. No SACs with bat species as a qualifying feature are located within 30km of the route. Based on their designation, these sites are valued as high.

7.3.15 There is one Special Protection Area (SPA) that would be crossed by the route: Thames Basin Heaths SPA. The South West London Waterbodies SPA is located within 1km, but falls outside the Order Limits. There is one SPA with a possible hydrological connection to the route: Solent and Southampton Water SPA. Based on their designation, these sites are valued as high.

7.3.16 There is one Ramsar site within 1km, but outside of the Order Limits: South West London Waterbodies Ramsar site. There is one Ramsar site with a possible hydrological connection to the route: Solent and Southampton Water Ramsar site. Based on their designation, these sites are valued as high.

7.3.17 There are three Suitable Alternative Natural Greenspace (SANGS) sites located within the Order Limits: Crookham Park SANGS; Chertsey Meads SANGS; and Southwood Golf Course proposed SANGS. These sites are all associated with the Thames Basin Heaths SPA. These sites are valued as negligible as they are principally designated to safeguard their function as recreational sites. However, potential indirect impacts to the Thames Basin Heaths SPA arising from Project activities within SANGS would be considered by the Project's report to inform the HRA.

7.3.18 Eight SSSIs are located within 1km of the Order Limits. Of these, the route would pass through: Bourley and Long Valley SSSI; Basingstoke Canal SSSI; Colony Bog and Bagshot Heath SSSI; Chobham Common SSSI; and Dumsey Meadow SSSI. Eelmoor Marsh SSSI is located immediately adjacent to the Order Limits. Staines Moor SSSI and Beacon Hill, Warnford SSSI are located over 800m away from the Order Limits. Based on their designation, these sites are valued as high.

7.3.19 Chobham Common is the only National Nature Reserve (NNR) within the 1km study area and the Order Limits would pass through it. Based on its designation, this site is valued as high.

7.3.20 Four Local Nature Reserves (LNR) are located within 1km of the Order Limits: Chertsey Meads LNR, Brentmoor Heath LNR, Bedfont Lakes LNR and Claymore LNR. Of these, the Order Limits cross Chertsey Meads LNR. Based on their designation, these sites are valued as medium.

7.3.21 There are numerous blocks of Ancient Woodland within the 1km study area. No blocks of Ancient Woodland would be crossed by the Order Limits although several blocks are located immediately adjacent to it. Based on their designation and the irreplaceable nature of this habitat, these sites are valued as high.

7.3.22 In Hampshire, approximately 45 Sites of Importance for Nature Conservation (SINC) are located within 1km of the Order Limits. The following 11 SINCs are located within the Order Limits and are valued as medium based on their designation:

- Maddoxford Farm Meadows SINC;
- Brockwood Copse and Roadside Strips SINC;
- Water Lane SINC;
- Ewshot Meadows SINC;
- Meadow near Soanes Copse SINC;
- Wakefords Copse, Crondall SINC;
- Pyestock Hill/Pondtail Heath SINC;
- South of Ively Road SINC;
- Cove Brook Grassland SINC;
- Cove Valley, Southern Grassland SINC; and
- Blackwater Valley, Frimley Bridge SINC.

7.3.23 Also in Hampshire, the Order Limits cross the South Downs Nature Improvement Area (NIA) and the following Biodiversity Opportunity Areas (BOA): Hamble Valley; St Catherine's Hill; Northern Wey Valley; Thames Basin Heaths; and the Blackwater Valley. These sites are valued as negligible but their presence and objectives would be considered when identifying biodiversity enhancement opportunities associated with the Project.

7.3.24 In Surrey, it has not been possible to identify all Sites of Nature Conservation Interest (SNCI) within 1km of the Order Limits as the results of a data request from SBIC have not yet been received. Based on partial information obtained from Local Planning Authorities, the following seven SNCIs are known to be located within the Order Limits and are valued as medium based on their designation:

- Frimley Hatches SNCI;
- Frith Hill SNCI;
- Frimley Fuel Allotments SNCI;
- River Thames SNCI;
- Land West of Littleton Lane SNCI;
- Land West of Queen Mary Reservoir, Ashford Road SNCI; and
- Princes Lake West of Clockhouse Lane SNCI.

7.3.25 Also in Surrey, the Order Limits cross the Thames Basin Heaths BOA. This site is valued as negligible but its presence and objectives would be considered when identifying biodiversity enhancement opportunities associated with the Project.

7.3.26 In Greater London, Bedfont Lakes Country Park Site of Metropolitan Importance (SMI) is located approximately 500m from the Order Limits. Mayfield Farm and the Water Treatment Works Site of Borough Importance Grade I (SBI) is located approximately 150m away from the Order Limits. Based on their designation, these sites are valued as medium.

Table 7.1 Statutory designated sites within 1km of the Order Limits and their value

Site	Name	Summary of reasons for notification	Approx. distance from the Order Limits	Value
SAC	Thursley, Ash, Pirbright & Chobham	Annex I habitats • 4010 North Atlantic wet heaths with *Erica tetralix* • 4030 European dry heaths • 7150 Depressions on peat substrates of the *Rhynchosporion*	Lies within	High
SPA	Thames Basin Heaths	Qualifying feature species During the breeding season: • Dartford warbler *Sylvia undata*, 445 pairs representing at least 27.8% of the breeding population in Great Britain (Count as at 1999). • Nightjar *Caprimulgus europaeus*, 264 pairs representing at least 7.8% of the breeding population in Great Britain (Count mean (1998-99). • Woodlark *Lullula arborea*, 149 pairs representing at least 9.9% of the breeding population in Great Britain (Count as at 1997).	Lies within	High
SPA and Ramsar	South West London Waterbodies	Qualifying feature species Migratory species during winter: • Gadwall *Anas strepera* • Shoveler *Anas clypeata*	440m to the west	High
SAC	Solent Maritime	Annex I Habitats • 1130 Estuaries • 1320 *Spartina* swards *Spartion maritimae* • 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) • Annex II Species • Desmoulin's whorl snail *Vertigo moulinsiana*	1.5km to the south of watercourses crossed by the Order Limits	High
SPA	Solent and Southampton	Qualifying feature species During the breeding season: Common tern *Sterna hirundo*, Little tern *Sterna*	1.5km to the south of watercourses	High

Site	Name	Summary of reasons for notification	Approx. distance from the Order Limits	Value
	Water	*albifrons*, Mediterranean gull *Larus melanocephalus*, Roseate tern *Sterna dougallii*, Sandwich tern *Sterna sandvicensis*. During winter: Black-tailed godwit *Limosa limosa islandica*, Dark-bellied Brent goose *Branta bernicla bernicla*, Ringed plover *Charadrius hiaticula*, Teal *Anas crecca*. The area also qualifies by supporting a winter assemblage of international importance, regularly supporting 53,948 individual waterfowl.	crossed by the Order Limits	
Ramsar	Solent and Southampton Water	The site is one of the few major sheltered channels between a substantial island and mainland in European waters. It includes many wetland habitats characteristic of the biogeographic region: saline lagoons, saltmarshes, estuaries, intertidal flats, shallow coastal waters, grazing marshes, reedbeds, coastal woodland and rocky boulder reefs. The site supports an important assemblage of rare plants and invertebrates. Assemblages of international importance with peak winter counts of 51,343 waterfowl. Species/populations occurring at levels of international importance: Black-tailed godwit, Dark-bellied Brent goose, Ringed plover, and Teal.	1.5km to the south of watercourses crossed by the Order Limits	High
SSSI	Bourley and Long Valley	Lowland dwarf shrub heath containing rarer birds such as Nightjar, Woodlark and Dartford warbler. The site is also designated as part of the Thames Basin Heaths SPA.	Lies within	High
SSSI	Basingstoke Canal	The Basingstoke Canal, together with associated flashes and heathland, is nationally important for aquatic plants and invertebrates.	Lies within	High
SSSI	Chobham Common	Extensive, open land which supports dry and wet heathland, bog, scrub and woodland. It supports a rich variety of characteristic heathland plants and animals, including many which are rare or scarce. The heathland bird community is particularly rich, and includes nationally important breeding populations of	Lies within	High

Site	Name	Summary of reasons for notification	Approx. distance from the Order Limits	Value
		Nightjar, Woodlark and Dartford warbler. The site is also designated as part of the Thames Basin Heaths SPA, Thursley, Ash, Pirbright & Chobham SAC and Chobham Common NNR.		
SSSI	Colony Bog and Bagshot Heath	This association of bogs, wet and dry heath, rich unimproved grassland, woodland and scrub contains plants and animals that are both county and nationally rare. The site has strong breeding populations of Nightjar, Woodlark and Dartford warbler. The site is also designated as part of the Thames Basin Heaths SPA and Thursley, Ash, Pirbright & Chobham SAC	Lies within	High
SSSI	Dumsey Meadow	Unimproved neutral grassland, cattle and pony-grazed riverside pasture situated on the flood-plain of the River Thames.	Lies within	High
SSSI	Eelmoor Marsh	The SSSI comprises a range of habitat types including an area of deep peat with structural affinities to a raised bog. The exceptionally rich acid bog flora supports at least 250 species of flowering plants and grasses and is of interest for its large populations of insectivorous plants. The species-rich grass heath within the SSSI is of a type found in the New Forest but rare elsewhere in Hampshire. The variety of habitat types present within the SSSI is reflected by a correspondingly diverse invertebrate fauna. The site is also designated as part of the Thames Basin Heaths SPA.	5m to the south east	High
SSSI	Staines Moor	The site consists of Staines Moor, a semi-natural stretch of the River Colne which flows through it, and three adjacent reservoirs. Staines Moor represents the largest area of alluvial meadows in Surrey and supports a rich flora while the reservoirs hold nationally important populations of wintering wildfowl. A pond at the site carries an aquatic flora which is of national importance; this flora includes one plant which is extremely rare in Britain, brown galingale *Cyperus fuscus*.	800m to the west	High
SSSI	Beacon Hill, Warnford	This chalk spur capped with clay-with-flints, with steep north and south facing slopes that support herb-rich chalk grassland flora, beech *Fagus*, ash *Fraxinus*,	875m south east	High

Site	Name	Summary of reasons for notification	Approx. distance from the Order Limits	Value
		hazel *Corylus* woodland and chalk scrub. The grassland supports an exceptionally rich butterfly fauna, including colonies of two rarities; the Silver–spotted skipper *Hesperia comma* and Duke of Burgundy fritillary *Hamearis lucina*.		
LNR	Chertsey Meads	Chertsey Meads is an open area of remnant floodplain meadow on the banks of the River Thames. Over 400 species of plants have been recorded, including flowers, grasses and sedges. 108 species of bird have been recorded including Lesser whitethroat *Sylvia curruca*, Reed bunting *Emberiza schoeniclus*, Sedge warbler *Acrocephalus schoenobaenus* and Reed warbler *Acrocephalus scirpaceus*.	Lies within	Medium
LNR	Brentmoor Heath	The reserve is predominantly wet and dry heath habitats, with areas of woodland, acid grassland and ponds. Areas of open ground in the wet heath support the insectivorous sundews, Cotton-grass *Eriophorum angustifolium* and White-beak sedge *Rhynchospora alba* in an otherwise characteristic community of Cross-leaved heath *Erica tetralix*, Purple moor grass *Molinia caerulea* and Deer grass *Trichophorum cespitosum*.	200m to the south	Medium
LNR	Bedfont Lakes	Habitats include willow carr, reedbeds, lakes, scrub, neutral grassland/wildflower meadows and bare soil. Over 350 species of plants, 156 species of birds, 20 species of mammal, 24 species of butterfly, 124 species of moth, 20 species of dragonflies and damselflies, 58 species of spider and 97 species of fungi.	820m south east	Medium
LNR	Claylands	Comprising secondary woodland, grassy and scrub covered south facing slopes, forming the banks of an old clay working. A meadow which was landfill, two neutral grassland meadows and a number of ponds which support a population of Great crested newts *Triturus cristatus*. Glow worms *Lampyris noctiluca* are also present on site.	840m south east	Medium

Habitats

7.3.27 To date, terrestrial and aquatic habitats have been mapped using predominantly desk-study information. Field surveys will support this baseline, as described in the Survey Methodology Report provided in Appendix 3.

7.3.28 Some of the habitats within the Order Limits are included on local or national priority habitat inventories (under the requirements of Section 41 of NERCA 2006 and/or Local Biodiversity Action Plans). These are shown in Figure 7.2 and summarised in Table 7.2.

7.3.29 Within Sections A, B and C of the route, between Boorley Green and Aldershot, priority habitats largely comprise Lowland Mixed Deciduous Woodland and Hedgerows, with localised areas of Coastal and Floodplain Grazing Marsh along rivers and small watercourses. Other priority habitats, such as Lowland Calcareous Grassland, generally fall within designated sites only.

7.3.30 From the Aldershot area north-east, areas of priority habitat become more extensive and dense, with large blocks of woodland around the Order Limits. Again, other priority habitats fall within designated sites, including extensive tracts of Lowland Heathland, and there are wetland areas, described as Lowland Fens and Purple Moor Grass and Rush Pasture.

7.3.31 94 watercourse crossings have been identified. These include 73 ‘ordinary watercourses’ (i.e. surface waters for which lead local flood authorities, district councils and internal drainage boards are responsible), 15 designated ‘main rivers’ (i.e. larger rivers and streams for which the Environment Agency have responsibility in England), four lakes and two canals. Watercourses proposed to be crossed include main rivers (predominantly designated under the Water Framework Directive), ordinary watercourses and minor tributaries. All water receptors have the potential to support species of conservation value: macroinvertebrates, fish, aquatic flora and invasive species.

7.3.32 The value of habitats within designated sites are considered high or medium according to the assessment set out in Section 7.4. Outside designated sites, priority habitats are considered to be of medium value, while non-priority habitats are considered to be of low value.

Protected and notable species

7.3.33 The desk study and field surveys undertaken to date have confirmed the presence of several legally protected and notable species within 1km of the Order Limits. These are summarised in Table 7.3. Values have been given using the criteria used in Table 7.4.

Further baseline surveys will be undertaken during 2018 for botany, dormouse, badger *Meles meles*, bats, otter *Lutra lutra*, water vole *Arvicola amphibius*, GCN, reptiles and aquatic ecology (methodologies provided in Appendix 3). Full details of the desk study and field survey results will be provided in the ES.

Table 7.2 Summary of known Priority Habitats within the Order Limits based on desk-study information

Priority habitat type	Description
Arable Field Margins	Found throughout the Order Limits where arable fields are present.
Coastal and Floodplain Grazing Marsh	Found between Sections A to E of the route (between Boorley Green and Farnborough). Within the flood zone of rivers such as the River Wey north-east of Alton and small watercourses, such as the Cove Brook in Farnborough. Based on aerial photography many areas described as this priority habitat are considered to comprise improved grassland although further field surveys would confirm this.
Hedgerows	Found throughout the Order Limits in areas of open countryside.
Lowland Dry Acid Grassland	Found as small areas within designated sites, often forming a mosaic with dwarf-shrub habitat within heathland.
Lowland Fens	Found within the Order Limits where it crosses Chobham Common SSSI/NNR and Colony Bog and Bagshot Heath SSSI (and the associated Thursley, Ash, Pirbright & Chobham SAC).
Lowland Heathland	Found within statutory designated sites that comprise the Thames Basin Heaths SPA. Includes dry and wet heathland.
Lowland Meadows	Very localised, found within designated sites such as Dumsey Meadows SSSI, Chertsey Meads LNR and Ewshot Meadows SINC.
Lowland Mixed Deciduous Woodland	Found throughout the Order Limits as small scattered and often linear blocks of woodland. Less frequently found as large blocks of woodland.
Ponds	There are 11 ponds within the Order Limits.
Purple Moor Grass and Rush Pastures	Very localised, confined to designated sites such as Ewshot Meadows SINC.
Rivers	94 watercourse crossings have been identified, including 73 ordinary watercourses, 15 designated main rivers, four lakes and two canals. Rivers include the River Wey near Alton and the River Thames at Chertsey.
Wet Woodland	Very localised, found in the Cove Valley, near Farnborough. Also present alongside the A331 at Frimley.

Table 7.3 Summary of desk study and field survey results for protected and notable species

Receptor	Summary of results (to date)	Value
Great crested newts	Data provided by HBIC, SARG and MAGIC confirm the presence of GCN within the data search study area. Data have been requested from SBIC but have not yet been received. To date, 245 ponds have been assessed. All accessible ponds were subject to Habitat Suitability Index (HSI) and eDNA surveys in 2018 to confirm the presence/likely absence of GCN, as per the methods described in Appendix 3 Scoping Survey Methodology Report. Of those surveyed, GCN presence has been confirmed in 25 ponds.	High (This valuation takes into account the baseline information obtained to date and the potential for large populations of GCN to be present within the footprint of the Order Limits
Bats	The results of the desk study confirm the presence of several species of bat within the data search study area. High value species (i.e. those that meet the criteria described in Table 7.5, below) are also present, including known roosts of barbastelle *Barbastella barbastellus* and Bechstein's bat *Myotis bechsteinii*. These are in woodland owned by the National Trust at Blackhouse Copse (see Figure 7.2 Sheet 4), within approximately 100m of the Order Limits. There are no records of confirmed roosts within the Order Limits based on data received (to date) during the desk study. Data have been requested from the Surrey Bat Group and SBIC but have not yet been received. Ground-based assessments of accessible trees within the Order Limits have commenced in accordance with the methods in Appendix 3. During the surveys completed to date, confirmed roosts were recorded at Frimley Hatches in the route Section E. Other trees with 'moderate' or 'high' potential to support roosting bats have also been recorded within the Order Limits. Further surveys will be undertaken in accordance with methodologies described in Appendix 3.	High (This is a precautionary valuation taking into account the potential for high status roosts of rare species to be present.)
Dormice	The desk study confirms the presence of dormouse within 1km of the Order Limits. A review of high-resolution aerial photography has identified all habitats that are considered to be suitable for dormice. This was based on the type and structure of the habitat, the proximity to confirmed dormouse records, and the presence of inter-connecting habitat. Dormice are common in Hampshire and Surrey (PTES, undated) and are considered likely to be present within all suitable habitats (i.e. woodland, scrub and hedgerows) connected to the wider landscape, especially in areas of known dormouse presence. Dormice are unlikely to be	Medium (This valuation takes into account the high level of legal protection but also the general widespread and abundant distribution of this species within the local

Receptor	Summary of results (to date)	Value
	present in Section H between the M25 and the West London Terminal storage facility, due to fragmentation of habitats caused by urban areas and major road and railway infrastructure. Further surveys will be undertaken in accordance with methodologies described in Appendix 3.	landscape. It also considers the likely low populations that may be affected given the localised nature of the Project.)
Badgers	Badgers are abundant and widespread and could be present in suitable habitat almost anywhere within or adjacent to the Order Limits. The potential for sett presence is greatest in woodland, scrub or hedgerow habitats, especially those associated with good drainage (e.g. slopes, embankments). Although setts can be found in open habitats, the potential presence of main setts is greatly reduced in fields subject to regular ploughing. The presence of badgers has been confirmed within the data search study area. There are no records of setts within the Order Limits, although this does not indicate sett absence from suitable habitats. Surveys undertaken to date have identified setts, including two main setts, within 30m of the Order Limits. Further surveys will be undertaken in accordance with methodologies described in Appendix 3.	Low (This valuation takes into account the abundance, wide distribution and low conservation status of badgers. It does acknowledge the legal protection for this species.)
Riparian mammals (Otters and Water voles)	The desk study confirms the presence of riparian mammals within the data search study area. In the Hampshire data search study area, there is one record of water voles on a tributary of the River Hamble to the west of Bishop's Waltham in Section A. This watercourse would be crossed by the route. There are 11 individual records of otter in the Hampshire data search study area, although these focus on just three locations: the River Hamble, north of Botley; the River Wey, near Alton; and the Blackwater River, near Farnborough. Riparian mammal records for Surrey have been requested from SBIC but have not yet been received. Further surveys will be undertaken in accordance with methodologies described in Appendix 3.	High (This precautionary valuation takes into account the conservation status of Water voles and the legal protection given to Otters and Water voles)
Common reptiles	The desk study confirms the presence of all four common species of reptile within the data search study area in Hampshire: adder *Vipera berus*, grass snake *Natrix natrix*, slow-worm *Anguis fragilis* and common lizard *Lacerta vivipara.* There is potential for common reptiles to be present in suitable habitats (e.g. rough grassland, woodland rides, heathland) anywhere	Low (This valuation takes into account the generally widespread distribution and

Receptor	Summary of results (to date)	Value
	within the Order Limits. Further surveys will be undertaken in accordance with methodologies described in Appendix 3.	abundance of common reptiles within suitable habitats, and the likely low populations that would be present given the localised nature of the Project.)
Rare reptiles	The distribution of rare reptiles (i.e. Sand lizard *Lacerta agilis* and Smooth snake *Coronella austriaca*) within the data search study area is restricted to a low number of well-studied heathland sites in Surrey. Data have been requested from SBIC but have not yet been received. However, data from SARG confirm that Sand lizard are present at Chobham Common SSSI/NNR and Colony Bog and Bagshot Heath SSSI, although fine-resolution data showing the precise locations of these records in relation to the Order Limits are yet to be received. Sand lizard are known to be present at Eelmoor Marsh SSSI but this site falls outside the Order Limits (Marwell Wildlife, undated). Further surveys will be undertaken in accordance with methodologies described in Appendix 3, as required.	High (This precautionary valuation takes into account the conservation status of rare reptiles, their restricted distribution and their legal protection.)
Breeding birds	There are numerous records of breeding birds from within the data search study area. These include species that have increased levels of legal protection, or are listed under LBAPs and/or Section 41 of NERCA 2006 (hereafter referred to as 'notable species of bird'). Records of Annex I species associated with the Thames Basin Heaths SPA have been obtained from 2Jays Ecology. Breeding birds, including notable species, could be present in almost all habitats within the Order Limits, including arable fields and grassland. In general terms, the most important habitats for breeding birds are hedgerows, woodland and rough grassland and heathland sites. Much of the route is located within arable fields or improved grassland. Although these habitats are generally unsuitable for most breeding birds recorded within the data search study area, they are potentially of local importance for priority species of bird such as skylark *Alauda arvensis* and grey partridge *Perdix perdix.* All heathland crossed by the Order Limits is part of the Thames Basin Heaths SPA designated for breeding populations of woodlark, nightjar and Dartford warbler. The SSSIs within the SPA	Low (This valuation excludes breeding bird assemblages associated with designated sites.)

Receptor	Summary of results (to date)	Value
	are also notable for other breeding birds. Breeding birds outside designated sites are given a low value rating. Breeding birds associated with SPAs and SSSIs are included within the valuation for those sites and so are considered to be of high value within these sites.	
Wintering birds	The desk study results described above for breeding birds are also applicable to over-wintering birds, as the information provided did not differentiate between resident species and those on passage or over-wintering. However, of the records received, some species do not breed, or only rarely breed, within the data search study area. These records can be assumed to be referring to over-wintering or passage species, including dark-bellied Brent goose and dunlin *Calidris alpine*. Some of the habitats crossed by the route would be used by notable species of bird for foraging and roosting during the winter, for example lapwing *Vanellus vanellus.* These habitats are abundant and widespread throughout the local landscape. There is potential for qualifying species associated with the Solent and Southampton Water SPA to use habitats within or adjacent to the Order Limits (e.g. dark-bellied Brent geese use cereal fields close to the coast).	Negligible (This takes into account the distance of wintering bird designated sites from the Order Limits and the abundance of suitable alternative habitats within the local landscape.)
Vascular and lower plants	Notable vascular and lower plant taxa are present within the data search study area, including within the Order Limits. These are valued by designation below. No legally protected species have been recorded to date, although information requested from SBIC is yet to be received. A summary of notable species in Hampshire is provided below. Further surveys will be undertaken in accordance with methodologies described in Appendix 3.	
	Nationally Scarce and Rare - Three Nationally Rare and 14 Nationally Scarce taxa have been recorded to date. Of the Nationally Rare species, all are non-native in the study area. The following Nationally Scarce species have been recorded: • fine-leaved sandwort *Minuartia hybrida*; • French oat-grass *Gaudinia fragilis*; • gold-of-pleasure *Camelina sativa*; • green-flowered helleborine *Epipactis phyllanthes*; • large-leaved Lime *Tilia platyphyllos*;	High

Receptor	Summary of results (to date)	Value
	• marsh clubmoss *Lycopodiella inundata*; • pale dog-violet *Viola lactea*; • shady horsetail *Equisetum pratense*; • spreading hedge-parsley *Torilis arvensis*; and • wall bedstraw *Galium parisiense*. Two additional Nationally Scarce species are non-native. Fine-leaved sandwort, marsh clubmoss, pale dog-violet and spreading hedge-parsley are also priority species.	
	Priority species – Nine priority species have been recorded to date. Of these, five are Nationally Rare or Scarce and are discussed above. The other species are: • chamomile *Chamaemelum nobile*; • cornflower *Centaurea cyanus*; • tubular water-dropwort *Oenanthe fistulosa;* and • shepherd's-needle *Scandix pecten-veneris.*	Medium
	Locally scarce or rare, and LBAP – Twenty species are listed on the Hampshire BAP, of which 14 are Nationally Rare or Scarce or priority species. The remaining six are: • broad-leaved spurge *Euphorbia platyphyllos*; • green-winged orchid *Anacamptis morio*; • heath cudweed *Gnaphalium sylvaticum*; • six-stamened waterwort *Elatine hexandra*; • stag's-horn clubmoss *Lycopodium clavatum*; and • stream water-crowfoot *Ranunculus penicillatus* subsp. *Pseudofluitans*.	Medium
	Red-listed species – The remaining 49 notable plant taxa are listed on the Great Britain and/or England vascular plant red lists as Near Threatened or Vulnerable.	Low
Aquatic invertebrates	Data have been requested from the EA for all watercourses likely to be crossed by the route. Few species of invertebrate fauna are provided protection under European, national or local legislation. Those that are can likely be presumed absent from the Order Limits and immediate catchment area due to geography, habitat preference, and water chemistry. This will be reviewed on receipt of EA baseline data.	Unknown but assumed to be Low

Receptor	Summary of results (to date)	Value
Fish	Data have been requested from the EA for all watercourses likely to be crossed by the route. These data have yet to be received. The main rivers and ordinary watercourses can be expected to support European eel *Anguilla anguilla* and stocks of Cyprinidae species. Migratory species, including brown trout *Salmo trutta*, lamprey species *Petromyzon marinus, Lampetra fluviatilis* and *Lampetra planeri* and salmon *Salmo salar* may be restricted to watercourses with good connections to their estuarine catchments.	Medium
Aquatic receptors	A number of aquatic receptors are known to be present within the Order Limits including rivers, canals and lakes. The receptors relate to main rivers (predominantly designated under the WFD), ordinary watercourses and minor tributaries. All aquatic receptors have the potential to support species of conservation and recreational interest: macroinvertebrates, fish, aquatic flora and invasive species. The availability of fish and invertebrate spatial data has been established through www.data.gov.uk. Data have been requested from the EA for all likely to be crossed by the route to provide both temporal and species information. Additional information relating to the water environment can be found in Chapter 8 - Water.	Medium
Other notable species	Outside designated sites in Hampshire, the HBIC data search confirms the presence of several notable species that are listed on LBAPs or in accordance with Section 41 of NERCA 2006. These include brown hare *Lepus europaeus*, harvest mouse *Micromys minutus*, polecat *Mustela putorius*, hedgehog *Erinaceus europaeus* and yellow-necked mouse *Apodemus flavicollis*. Several species of notable invertebrate have also been recorded. Outside designated sites in Surrey, priority species listed in accordance with Section 41 of NERCA 2006 are expected to be present within the Order Limits. These include the same mammal species listed for Hampshire (excluding yellow necked-mouse) plus pygmy shrew (*Sorex minutus*) and water shrew (*Neomys fodiens*). Several species of notable invertebrates have been recorded in Surrey and there is potential for some to be present within the Order Limits, where suitable habitats occur.	Low

7.4 Likely Significant Effects

7.4.1 This section describes the process of scoping the ecological receptors identified in Section 7.4 and considering whether the anticipated potential impact pathways would result in likely significant effects.

7.4.2 This assessment is only possible at this stage due to the predictable nature of most potential impacts associated with pipeline construction and operation. With a few exceptions, most impacts would be restricted to within the Order Limits and would be temporary, short-duration and reversible.

7.4.3 Decommissioning activities would be subject to an appropriate decommissioning strategy, as per Chapter 3 - Description of the Development. It is not practical to assess the effects of decommissioning at this stage as the methodology and likely good practice mitigation measures will not be defined until closer to the time, at least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

7.4.4 Based on the habitats likely to be affected and the baseline information known to date, many impacts would be mitigated using well-established good practice mitigation measures (see Chapter 4 - Design Evolution for examples). It is therefore considered reasonable to conclude at this stage which receptors should be scoped in or out of the EIA and ES.

7.4.5 This assessment does not replace the detailed assessment that would be undertaken in the ES, HRA and Protected and Legally Controlled Species Compliance Report.

7.4.6 The starting point for an assessment of effects is to determine which receptors require assessment and the identification of all potential environmental changes arising from the Project that could affect them (i.e. impact pathways). The CIEEM Guidelines recommend, as a minimum, that ecological receptors requiring assessment should meet the following criteria:

- be of sufficient value such that effects upon them may be significant; and
- be potentially vulnerable to significant effects arising from the development.

Identification of Receptors

7.4.7 The identification of receptors considered during the Scoping assessment has been informed by a combination of desk study, stakeholder engagement and professional judgement. The receptors have been selected based on an understanding of their value and the potential for direct or indirect effects of the Project to result in significant effects.

7.4.8 The topic-specific criteria for determining value are shown in Table 7.4. These criteria are adapted from the CIEEM Guidelines, and take into account factors such as: rarity; ecosystem function; habitat diversity; connectivity; conservation status; population size; and natural range.

7.4.9 In this assessment, the term ‘value’ is used in preference to ‘importance’ as is used in the CIEEM Guidelines. This is to provide consistency in terminology between different discipline chapters within the ES.

7.4.10 An assessment of effects has been carried out on those receptors determined to be of ‘low’ value or greater *and* which are considered to have the potential to be significantly affected by the Project.

Table 7.4 Criteria for determining the value of ecological receptors

Value	Criteria
High (national/ international)	International: European designated sites, including SPAs; potential SPAs (pSPAs); SACs; candidate or possible SACs (cSACs or pSACs); and Wetlands of International Importance (Ramsar sites). National: statutory designated sites, including SSSIs, NNRs; Ancient Woodland; species recorded as 'critically endangered' under the International Union for Conservation of Nature (IUCN) Red List of Threatened Species; resident or regularly occurring populations of species which may be considered at an international or national level where either of the following criteria is met: • the loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; or • the population forms a critical part of a wider population at this scale. Nationally Rare or Scarce taxa: Nationally Rare taxa are those occurring in 15 or fewer 10km OS grid-squares in the UK, Nationally Scarce species in 16-99 10km squares.
Medium (county/ regional)	Statutory designated sites: LNRs. Non-statutory designated sites (i.e. SINCs, SNCIs, Sites of Metropolitan Importance, Sites of Borough Importance) designated in the county/regional area context. Areas of key/priority habitats identified in the LBAP. Species or habitats listed in accordance with the requirements of Section 41 of NERCA 2006. Resident or regularly occurring populations of species which may be considered at a regional or county level where either of the following criteria is met: • the loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or • the population forms a critical part of a wider population at this scale.
Low (local)	Receptor is relatively common and widespread but has elevated conservation status (e.g. it is listed in accordance with the requirements of Section 41 of NERCA 2006, LBAP, Birds of Conservation Concern Red or Amber listed, Red Data Book listed and/or is legally protected).
Negligible	Receptor is abundant and widespread, receives no legal protection and is not of elevated conservation concern status.

Assessment of Significance

7.4.11 In accordance with the CIEEM Guidelines, a significant effect is one that either supports or undermines biodiversity and/or conservation objectives for valuable ecological receptors.

7.4.12 The assessed degree of significance of effect consists of a receptor's value and the potential magnitude of change caused by a given effect. To determine this, the guidance given in Chapter 6 Impact Assessment Methodology has been used, together with professional judgement. Only those effects considered likely to result in a 'moderate' or 'major' magnitude of change will be considered as being likely significant effects. Those assessed as 'negligible' and 'minor' will be considered as non-significant effects (see Table 7.6 for criteria used to define magnitude of change).

Identification of impact pathways

7.4.13 The potential impacts from the Project, and the zone of influence within which receptors might experience effects, are listed in Table 7.5, below. Based on the value of the receptors and/or the availability of embedded and good practice mitigation (as defined in Chapter 6 Impact Assessment Methodology), an assessment has been made as to whether or not significant effects might arise. This enables a decision on whether the impact pathway and/or receptor can be scoped out of the ES.

7.4.14 This Scoping assessment takes into account the proposed construction techniques (see Chapter 3 Description of the Development) and proposed embedded and good practice mitigation (see Chapter 4 Design Evolution).

7.4.15 Guidance provided in the document *Advice Note Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping* (The Planning Inspectorate, 2017) is also considered.

Table 7.5 Summary of impact pathways, zones of influence, and relevant ecological receptors

Impact pathway	Zone of influence and rationale	Receptor potentially sensitive to the impact pathway
Mortality and injury of species	Physical interaction between species and project infrastructure, machinery or activities would be limited to areas within the Order Limits only.	GCN Bats Dormice Badgers Riparian mammals Breeding birds Common reptiles Rare reptiles Vascular and lower plants Other notable species Fish and other aquatic fauna
Habitat loss/gain, fragmentation or modification	Habitat loss/gain would be restricted to areas cleared to make way for pipeline construction, temporary compounds or temporary access roads. This would include impacts to soils as well as surface vegetation. Retained habitats to either side of the Order Limits may be temporarily fragmented between the period when vegetation/topsoil clearance works start and habitat reinstatement and creation are completed. Habitats outside the Order Limits may be altered due to changes to air quality or hydrology. These are discussed below.	Statutory designated sites Non-statutory designated sites Priority habitats Ancient Woodland GCN Bats Dormice Badgers Riparian mammals Breeding birds Common reptiles Rare reptiles Vascular and lower plants Other notable species Fish and other aquatic fauna
Species disturbance (from changes to noise,	The area subject to noise disturbance varies based on the activity being undertaken and the sensitivity of the individual receptor. All potentially	SPAs and Ramsar sites designated for breeding or wintering birds.

Impact pathway	Zone of influence and rationale	Receptor potentially sensitive to the impact pathway
vibration, visual and light stimuli)	sensitive receptors within the area likely to be exposed to noise level changes have been considered. Consideration has been given to the effects of visual disturbance for all potentially sensitive receptors. The zone of influence for visual disturbance is extremely difficult to quantify and varies with each receptor and type of stimuli. This assessment has been informed using professional judgement and in consultation with statutory advisors; however, the baseline study area fully encompasses all likely zones of influence.	Non-statutory designated sites (designated for breeding or wintering birds or other species of fauna) Bats (within roosts only) Dormice Badgers (within setts only) Riparian mammals Breeding birds Rare reptiles Fish and other aquatic fauna Other notable species
Air quality changes (resulting in habitat loss/modification)	The effects of air emissions only need to be considered where road traffic flows exceed the thresholds defined in Appendix 8.1. Dust effects for ecological receptors during the construction stage have been assessed up to 50m from the Order Limits (IAQM, 2014)	Statutory designated sites Non-statutory designated sites Priority habitats Ancient Woodland Vascular and lower plants
Hydrological changes (resulting in mortality/injury of species and/or habitat loss/modification)	All sensitive receptors with hydrological connection to an affected waterbody.	Statutory designated sites Non-statutory designated sites Priority habitats Vascular and lower plants Fish and other aquatic fauna
Introduction and spread of invasive non-native species (INNS) (resulting in habitat loss/modification)	Effects associated with INNS would only likely be experienced within the immediate vicinity of areas where machinery movements, soil stripping, storage and habitat reinstatement would be undertaken. However, there is potential for wider effects to occur where works would be within the vicinity of flowing watercourses.	Statutory designated sites Non-statutory designated sites Priority habitats Ancient Woodland Vascular and lower plants

Mortality and injury of species

7.4.16 During the construction phase, the following activities could potentially result in mortality and injury of species receptors: vegetation clearance; topsoil clearance; watercourse crossings; and entrapment in excavations. Significant effects could arise if protected or notable species are present within the Order Limits, especially if they could not avoid the works. This impact pathway will be scoped in to the ES.

7.4.17 Another potential source of mortality or injuring could arise through collision with construction machinery. This would be particularly relevant for notable species that are active during the daytime construction periods, for example brown hare. However, the amount of plant in operation at any one time in any one place is considered to be very small (see Chapter 3 Description of the Development). The likelihood that significant effects could arise from this specific pathway (either alone or cumulatively with other sources) is so low that a specific assessment is not proposed. This is in accordance with Planning Inspectorate Advice Note 7 questions 3 and 4.

7.4.18 There would be no risk of mortality and injury during operation of the pipeline and so this impact pathway would be scoped out of the ES. This is in accordance with Planning Inspectorate Advice Note 7 question 1.

7.4.19 Based on the above, mortality and injury during construction only (excluding collision with vehicles) is scoped in to the EIA.

Vegetation and topsoil clearance, watercourse crossings and entrapment in excavations could all result in the mortality or injury of species. They are therefore be scoped in for construction.
The likelihood of mortality or injury of species during operation is so low that it is scoped out.

Habitat loss/gain, fragmentation and modification

7.4.20 Construction work within the Order Limits will require the temporary loss of terrestrial and aquatic habitats, including priority habitats and habitats likely to be used by protected and notable species. Impacts to soils could also arise.

7.4.21 Where possible, habitats would be reinstated on completion of construction and opportunities for habitat enhancement identified. Examples of potential habitat enhancements include targeted heathland restoration or management in the Thames Basin Heaths BOA, and hedgerow restoration in the South Downs National Park. All enhancements would be discussed and agreed with relevant stakeholders, and incorporated into the ES and Register of Environmental Actions and Commitments to be submitted with the application for development consent.

7.4.22 Habitat fragmentation would potentially result from the temporary removal of linear habitat features such as hedgerows, lines of trees and riparian corridors. This could potentially affect protected or notable species that rely upon such habitats for foraging, commuting or dispersing.

7.4.23 Modification of priority habitats could occur to retained terrestrial and freshwater habitat within and near to the Order Limits. This could arise from hydrological and air quality changes. The potential for these effects is discussed separately, below.

7.4.24 Based on the above, this impact pathway is scoped into the EIA for the construction phase.

7.4.25 There will be no habitat loss during routine operation of the pipeline. As such, significant effects could not arise and so operational habitat changes are scoped out of the ES. This is in accordance with Planning Inspectorate Advice Note 7 question 1.

Habitat loss, gain, fragmentation and modification are scoped into the ES for the construction phase. There will be potential for loss but also enhancements to habitats. The operation phase is scoped out for this pathway due to the likely small scale and local nature of the works.

Species disturbance (from changes to noise, vibration, visual and light stimuli)

7.4.26 Disturbance to important receptors could result from changes in noise, vibration or visual stimuli.

7.4.27 During construction, disturbance could arise from the following activities: fencing, topsoil stripping, compound set up, pipeline construction, and reinstatement.

7.4.28 The duration of construction activities at any one location would vary. It is expected that approximately 450m per week of pipe can be laid in rural areas, and approximately 90m per week in urban areas (see Chapter 3 Description of the Development). For any sensitive receptor along the route, elevated visual or construction noise and vibration levels would occur over a short duration, mainly during daytime periods. There would also be days when no construction activities would be visible or audible. Further information relating to the noise baseline assessment and likely significant effects is provided in Appendix 8.

7.4.29 Temporary security lighting would be required to illuminate site compounds. Lighting may also be required in the winter at specific works areas. All lighting would be designed in accordance with current good practice guidelines to avoid and reduce disturbance to potentially sensitive ecological receptors. This is summarised in Chapter 4 Design Evolution and will be detailed in the CoCP to accompany the ES. As such, the effects of lighting are considered unlikely to result in significant effects and so would be scoped out of the ES. This is in accordance with Planning Inspectorate Advice Note 7 questions 3, 5 and 6.

7.4.30 Despite the above, construction activity would take place within sites highly sensitive to the effects of noise and visual disturbance, most notably the Thames Basin Heaths SPA. There is also potential for disturbance to protected or notable species where present within the Order Limits. As such, this impact pathway would be scoped in to the ES (excluding disturbance caused by lighting).

7.4.31 There will be no changes to noise, vibration or visual stimuli during the operational phase. As such, significant effects could not arise and so operational disturbance is scoped out of the EIA. This is in accordance with Planning Inspectorate Advice Note 7 question 1.

7.4.32 Despite the short duration, there is a potential for significant effects if sensitive receptors are present within the zone of influence. Therefore, disturbance during the construction period is scoped in.

Air quality change

7.4.33 Air quality changes could occur through dust and changes in pollutant levels caused by emissions from construction plant and machinery.

7.4.34 An air quality assessment is provided in Appendix 8. The assessment concludes that the good practice mitigation measures outlined in Chapter 4 Design Evolution, and to be secured through the CoCP, would be sufficient to prevent or reduce changes in air quality during construction as a result of dust deposition. Road traffic flows would not exceed those at which a significant effect could arise to important ecological receptors and so have been scoped out.

7.4.35 Changes in air quality are not anticipated during the operational phase.

7.4.36 As such, air quality changes are scoped out of the ES. This is in accordance with Planning Inspectorate Advice Note 7 questions 3, 5 and 6.

Air quality changes are scoped out due to the provision of good practice mitigation and the minor changes predicted.

Hydrological changes

7.4.37 Hydrological changes are detailed in Chapter 8 Water and include changes to both water quality and quantity within nearby watercourses and wetland areas. Changes in hydrology, fluvial geomorphology and hydrogeology are important to terrestrial and freshwater ecology due to the following factors:

- water quantity has an important role in structuring the flora and fauna communities in watercourses, ponds and wetlands;
- sediment and other pollutant releases have the potential to adversely affect sensitive ecological receptors; and
- ecological receptors can be sensitive to alterations of runoff regimes changing the quality of surface and groundwater.

Hydrological change during construction and operation are scoped in.

7.4.38 There is potential for hydrological change to cause significant effects during construction where works would directly or indirectly affect watercourses or wetland habitats, especially those that are associated with designated sites or protected / notable species. This impact pathway is scoped in to the EIA for relevant receptors.

7.4.39 During the operational phase, there is potential for long-term changes to groundwater flow. These could cause significant effects to sensitive wetland habitats and vegetation communities, especially those within designated sites. Operational effects to watercourses are not expected (see Chapter 8 Water) and so are scoped out of the ES in accordance with Planning Inspectorate Advice Note 7 question 1. Changes to the groundwater regime during operation are scoped in to the EIA.

Introduction and spread of invasive non-native plant species (INNS)

7.4.40 Any introduction or spread of INNS would potentially cause significant adverse effects to sensitive habitats. This is because of the dominance that these species can have over native species.

7.4.41 During the construction works, topsoil and subsoil potentially containing INNS would be disturbed. Such soil or seed and "propagules" could be spread during construction activities, including excavation and machinery movements.

7.4.42 However, it is considered that the spread of INNS can be adequately controlled through good practice mitigation measures, as outlined in Chapter 4 Design Evolution and to be secured by the CoCP.

Due to the use of good practice outlined in the Chapter 4, which will be secured in the CoCP, introduction and spread of INNS is scoped out.

7.4.43 There is considered to be a negligible risk of spreading INNS during the operational phase due to the nature of the activities that would be undertaken and the availability of good practice measures.

7.4.44 Given the above, the effects of INNS are considered unlikely to result in significant effects and so are scoped out of the EIA. This is in accordance with Planning Inspectorate Advice Note 7 questions 3, 5 and 6.

Receptor Based Assessment

Statutory designated sites

7.4.45 There is a potential for significant effects to statutory designated sites to arise through the following impact pathways:

- habitat loss/gain, fragmentation or modification;
- hydrological changes; and
- disturbance.

7.4.46 The impact pathways and European designated sites detailed below would be subject to an HRA to assess likely significant effects to each respective site. A draft study to inform a Stage 1 HRA is provided in Appendix 5. The preliminary findings of that assessment have been taken into account by this Scoping Report.

Habitat loss/gain, fragmentation or modification

7.4.47 The following statutory designated sites would be crossed by the Project and so would be directly affected by construction activity:

- Thames Basin Heaths SPA;
- Thursley, Ash, Pirbright & Chobham SAC;
- Bourley and Long Valley SSSI;
- Chobham Common SSSI and NNR;
- Colony Bog and Bagshot Heath SSSI;
- Dumsey Meadows SSSI; and
- Chertsey Meads LNR.

7.4.48 Although good practice mitigation will be implemented (e.g. reducing the construction working area, habitat restoration, soil management), there is potential for significant effects to arise as a result of habitat loss given the high value of these receptors. Also, the design of the Project is likely to include habitat enhancements, where appropriate. There is therefore potential for significant habitat gain to arise. As such, the above sites are scoped into the EIA.

Statutory designated sites within the Order Limits are scoped in for habitat loss, gain, fragmentation, modification

7.4.49 The Basingstoke Canal SSSI would be crossed using trenchless construction techniques and would not be affected by this impact pathway. This site is scoped out of the EIA. This is in accordance with Planning Inspectorate Advice Note 7 question 1.

7.4.50 Designated sites outside the Order Limits would not be vulnerable to this impact pathway (hydrological change is discussed below) and so all other sites are scoped out of the EIA. This is in accordance with Planning Inspectorate Advice Note 7 question 1.

Hydrological change

7.4.51 Further information on the water environment can be found in Chapter 8 Water.

7.4.52 The route crosses areas potentially in hydrological connection to the following statutory designated sites that support, or potentially support, species or habitats that are sensitive to hydrological change:

- Thursley, Ash, Pirbright & Chobham SAC;
- Solent and Southampton Water SPA;
- Solent Maritime SAC;
- Solent and Southampton Water Ramsar site;
- Bourley and Long Valley SSSI;
- Chobham Common SSSI and NNR;
- Colony Bog and Bagshot Heath SSSI;
- Upper Hamble Estuary and Woods SSSI;
- Basingstoke Canal SSSI;
- Eelmoor Marsh SSSI; and
- Dumsey Meadows SSSI.

7.4.53 Changes to hydrological conditions as a result of the Project, either during construction or operation, have potential to result in significant effects to designated sites.

7.4.54 Good practice mitigation in the form of pollution prevention control measures would ensure that potential impacts arising from pollution events would be adequately controlled (see Chapter 4 Design Evolution). As such, the following designated sites that are outside of the Order Limits but downstream of the route are scoped out of the EIA as the potential impact pathway will be removed: Solent and Southampton

Water SPA; Solent Maritime SAC; Solent and Southampton Water Ramsar site; and the Upper Hamble Estuary and Woods SSSI. This is in accordance with Planning Inspectorate Advice Note 7 questions 5 and 6. More information is also provided in the draft study to inform a Stage 1 HRA in Appendix 5.

Statutory designated sites sensitive to hydrological change are scoped into the EIA

7.4.55 The Basingstoke Canal SSSI will be crossed using trenchless construction techniques and so the potential for hydrological change is considered to be negligible. As above in relation to habitat impacts, this site is scoped out of the EIA. This is in accordance with Planning Inspectorate Advice Note 7 question 1.

7.4.56 The following remaining sites are scoped into the EIA as the route is within or immediately adjacent to them and they support qualifying or notable features that are sensitive to changes to the groundwater regime: Thursley, Ash, Pirbright & Chobham SAC; Bourley and Long Valley SSSI; Chobham Common SSSI and NNR; Colony Bog and Bagshot Heath SSSI; Eelmoor Marsh SSSI; and Dumsey Meadows SSSI.

7.4.57 All other statutory designated wildlife sites are scoped out as there is no hydrological connectivity and/or the notable features of the site are not sensitive to hydrological change. This is in accordance with Planning Inspectorate Advice Note 7 questions 1 and 2.

7.4.58 All sites supporting groundwater dependent terrestrial ecosystems would be considered as part of a Water Framework Directive (WFD) Assessment, for which further information is provided in Chapter 8 Water.

Disturbance

7.4.59 Construction activity has the potential to disturb species for which statutory designated sites are notified. Examples are through changes in acoustic or visual stimuli. Such disturbance could result in significant effects if experienced during sensitive periods of the year, for example the bird breeding or overwintering seasons.

7.4.60 The following statutory designated sites are considered to be vulnerable to disturbance from the route and associated Order Limits and the features for which the sites are notified:

- Thames Basin Heaths SPA (including the following component SSSIs: Bourley and Long Valley SSSI; Chobham Common SSSI/NNR; Bourley and Long Valley SSSI; Colony Bog and Bagshot Heath SSSI; and Eelmoor Marsh SSSI) due to disturbance to Nightjar, Dartford warbler and Woodlark;
- South West London Waterbodies SPA due to the proximity of the Order Limits to wetland sites used by over-wintering gadwall and shoveler that have functional linkages to the SPA; and
- Solent and Southampton Water SPA and Ramsar site due to the proximity of the Order Limits to terrestrial habitats outside of the SPA but potentially used by dark-bellied Brent goose for foraging.

7.4.61 A draft study to inform a Stage 1 HRA has been produced which assesses whether Likely Significant Effects (LSE) would arise as a result of disturbance to the qualifying features of each of the European sites listed above. In each case, this concluded that LSE are not predicted as a result of the Project alone due to:

- embedded or good practice mitigation;
- the distance between the Order Limits and the designated site;
- the availability of suitable alternative habitats;
- the presence of buffer zones that would screen potentially disturbing activities; and/or
- the short duration and temporary nature of the proposed construction activities.

7.4.62 The draft study to inform a Stage 1 HRA is provided in Appendix 5 of this Scoping Report.

Species within statutory designated sites sensitive to disturbance are scoped in due to their high value

7.4.63 However, the above study is in a draft form and does not yet include an assessment of effects in-combination with other development projects. Given the high value of these receptors, this impact pathway is scoped in to the EIA until it can be agreed with Natural England that sufficient evidence has been provided to enable disturbance to be scoped out as a source of likely significant effects.

7.4.64 In addition, the ES will also identify and assess whether disturbance to other notable features of the SSSIs listed above would likely arise.

Non-statutory designated sites

7.4.65 There is potential for significant effects to statutory designated sites to arise through the following impact pathways:

- habitat loss/gain, fragmentation or modification;
- hydrological change; and
- disturbance.

Habitat loss/gain, fragmentation or modification

7.4.66 The following non-statutory designated sites would be crossed by the Project and so would potentially be directly affected by construction activity:

- Maddoxford Farm Meadows SINC;
- Brockwood Copse and Roadside Strips SINC;
- Water Lane SINC;
- Ewshot Meadows SINC;
- Meadow near Soanes Copse SINC;
- Wakefords Copse, Crondall SINC;
- Pyestock Hill/Pondtail Heath SINC;
- South of Ively Road SINC
- Cove Brook Grassland SINC;
- Cove Valley, Southern Grassland SINC;
- Blackwater Valley, Frimley Bridge SINC;
- Frimley Hatches SNCI;

- Frith Hill SNCI;
- Frimley Fuel Allotments SNCI;
- River Thames SNCI;
- Land West of Littleton Lane SNCI;
- Land West of Queen Mary Reservoir, Ashford Road SNCI; and
- Princes Lake West of Clockhouse Lane SINC.

7.4.67 There is also potential for unidentified sites in Surrey to be directly affected as data from SBIC has not yet been received.

7.4.68 Of the above sites, it is currently proposed to use trenchless construction techniques below Maddoxford Farm Meadows SINC and the River Thames SNCI. These sites are therefore scoped out of the EIA as direct impacts to them would not arise. This is in accordance with Planning Inspectorate Advice Note 7 question 1. These sites will be scoped back in, if the proposed construction methodology changes to open cut trenching.

7.4.69 For the remaining sites, embedded or good practice mitigation would be applied as outlined in Chapter 4 Design Evolution (e.g. reducing the construction working area, soil management, habitat restoration). However, there is still potential for significant effects to arise as a result of habitat loss given the value of these receptors. As such, these sites are scoped in to the EIA unless the Order Limits changes and/or direct impacts can be avoided (including through the use of trenchless construction techniques). All other non-statutory designated wildlife sites are scoped out in accordance with Planning Inspectorate Advice Note 7 question 1.

Hydrological changes

7.4.70 Several of the above sites are potentially vulnerable to hydrological changes during construction or operation of the Project. As such, this impact pathway would be scoped in with respect to non-statutory designated wildlife sites. Only those sites with sensitivity to hydrological change would be assessed.

Vulnerable non-statutory designated sites as listed are scoped into the EIA for habitat loss/gain, fragmentation and modification and hydrological changes

7.4.71 All sites supporting groundwater dependent terrestrial ecosystems would be considered as part of a Water Framework Directive (WFD) Assessment, for which further information is provided in Chapter 8 Water.

Disturbance

7.4.72 Construction activity has the potential to disturb species for which non-statutory designated sites are notified. Examples are through changes in acoustic or visual stimuli. Such disturbance could result in significant effects if experienced during sensitive periods of the year, for example the bird breeding or overwintering seasons.

7.4.73 It is currently unknown which of the non-statutory designated sites within the Project's zone of influence are vulnerable to disturbance. As such, all sites within, and immediately adjacent to, the Order Limits are scoped in as a precaution.

Ancient Woodland

7.4.74 It has been part of the Project's design to avoid passing through Ancient Woodland. Therefore, there would be no loss or fragmentation of this receptor (refer to Figure 7.1 for Ancient Woodland locations). The Order Limits are located in close proximity to Ancient Woodland and all works in these areas would be subject to good practice with respect to the protection of retained trees. This good practice would be secured through the CoCP, the content of which is summarised in Chapter 4 Design Evolution. The potential for Project effects to trees within Ancient Woodland is considered further in Chapter 10 Landscape and Visual Effects.

Due to embedded and good practice mitigation, Ancient Woodland is scoped out of the EIA for biodiversity.

7.4.75 Given the mitigation embedded in the design of the Project and the good practice measures that would be adopted, there would be a negligible risk of significant effects to Ancient Woodland and so this receptor is scoped out of the EIA. This is in accordance with Planning Inspectorate Advice Note 7 questions 1, 3, 5 and 6.

Priority habitats

7.4.76 The following impact pathways of relevance to priority habitats have been identified:

- habitat loss/gain, fragmentation or modification.

7.4.77 Groundwater dependent terrestrial habitats would also be potentially vulnerable to hydrological changes arising from the Project, during both construction and operation. This impact pathway is discussed in Chapter 8 Water.

Habitat loss/gain, fragmentation or modification

7.4.78 Several of the most valuable priority habitats within the Order Limits, such as Lowland Fens and Lowland Heathland, are wholly or largely within designated sites. These would be scoped in to the ES as part of the assessment for the respective designated site. The remaining priority habitats not within designated sites are discussed below.

Coastal and Floodplain Grazing Marsh

7.4.79 The Order Limits crosses four known areas of this priority habitat at Maddoxford Farm Meadows SINC (Section A), Wintershill (Section A), the River Wey at Holybourne (Section C), and Cove Brook Grassland SINC (Section E). However, of these locations, direct impacts to priority habitat would be avoided at Maddoxford Farm Meadows SINC and the River Wey as trenchless construction techniques (e.g. drilling) are currently proposed. Cove Brook Grassland SINC are scoped into the ES, as described in paragraph 7.4.66.

7.4.80 Based on records of plant species, a study of aerial imagery and the habitat data obtained from local record centres, the grassland at the remaining one site at Wintershill is considered likely to be of low value for nature conservation and therefore, any loss due to construction of the pipeline would not likely be significant. Moreover, these habitats are considered to be easily restored, so that any effects would be reduced by good practice mitigation. With the exception of Cove Brook SINC which would be assessed separately, significant effects to Coastal and Floodplain Grazing Marsh priority habitat by this pathway are not considered likely and so this priority habitat is scoped out of the EIA. This is in accordance with

Planning Inspectorate Advice Note 7 questions 3, 5 and 6.

Eutrophic Standing Waters

7.4.81 The Order Limits have been designed to avoid areas of standing water. The Order Limits will cross the Basingstoke Canal SSSI (Section D) (also considered separately) and the Staines Reservoir Aqueduct (Section H), both of which will be crossed using trenchless construction techniques under the current proposals. Significant effects to this priority habitat by this pathway are therefore not considered likely and so Eutrophic Standing Waters is scoped out of the EIA. This is in accordance with Planning Inspectorate Advice Note 7 question 1.

Hedgerows

7.4.82 The route would cross multiple hedgerows. The Order Limits have been selected to reduce impacts to hedgerows by avoiding these receptors, where practicable. Where hedgerows are crossed, the Order Limits have been aligned to make use of existing gaps, gates, or less valuable sections of hedge (e.g. avoiding mature trees), where practicable. Embedded mitigation would ensure that the construction working width be reduced to 10m at hedgerow crossings (see Chapter 4 Design Evolution).

7.4.83 All hedgerow loss would be temporary and would be replaced following construction. Furthermore, opportunities would be identified to enhance existing hedgerows (e.g. gapping up), and so a net-gain in hedgerows is anticipated. Enhancement opportunities would be incorporated into the ES and Register of Environmental Actions and Commitments to be submitted with the application for development consent. Based on the above, significant ecological effects by this pathway are not considered likely and so hedgerows are scoped out of the EIA. This is in accordance with Planning Inspectorate Advice Note 7 questions 5 and 6. Further information with respect to hedgerows and the historic environment and landscape assessments is provided in Chapters 9 and 10 respectively.

Lowland Calcareous Grassland

7.4.84 Outside designated sites, there are no known areas of Lowland Calcareous Grassland priority habitat within the Order Limits. Any additional areas identified through field survey that could not be avoided would be subject to good practice mitigation, such as restoration. There is therefore considered to be no pathway for significant effects through habitat loss to arise to Lowland Calcareous Grassland priority habitat outside of designated sites. This priority habitat is scoped out in accordance with Planning Inspectorate Advice Note 7 questions 1, 3, 5 and 6.

Lowland Dry Acid Grassland

7.4.85 Outside of designated sites, there are no known areas of Lowland Dry Acid Grassland priority habitat within the Order Limits. Any additional areas identified through field survey that could not be avoided would be subject to good practice mitigation, such as restoration (this habitat is readily restorable (e.g. see South East Water, 2018)). There would therefore be no pathway for significant effects by habitat loss to arise to Lowland Dry Acid Grassland priority habitat outside of designated sites. This priority habitat is scoped out of the EIA in accordance with Planning Inspectorate Advice Note 7 questions 1, 3, 5, 6 and 7.

Lowland Meadows

7.4.86 Outside of designated sites, there are no known areas of Lowland Meadows priority

habitat within the Order Limits. Any additional areas identified through field survey that could not be avoided would be subject to mitigation, such as appropriate soil management and restoration. There would therefore be no pathway for significant effects by habitat loss to arise to Lowland Meadows priority habitat outside of designated sites. This priority habitat is scoped out of the EIA. This is in accordance with Planning Inspectorate Advice Note 7 question 1.

Lowland Mixed Deciduous Woodland

7.4.87 The Order Limits have been selected to avoid woodland where practicable. Where woodland would be crossed (e.g. in urban areas where there is no viable route in the carriageway), the Order Limits and associated haul routes have been positioned to make use of existing rides or gaps, and to avoid high value trees (e.g. those with moderate or high bat roost potential), where practicable. Embedded mitigation would ensure that the construction working width would be reduced to 10m at woodland crossings. Woodland loss would be mitigated or compensated through replacement planting following construction. However, there may be restrictions associated with planting trees directly over the pipeline and there would be a long-term impact if mature trees were to be felled as replacement planting would likely comprise young tree specimens.

7.4.88 Woodland soils would be subject to appropriate soil management and restoration. Given the localised impacts and the overall woodland resource within the local landscape (Surrey and Hampshire are the first and third most wooded counties in England, respectively (Forestry Commission, 2002)), temporary loss of discrete areas of woodland is not considered to be significant. Lowland Mixed Deciduous Woodland are scoped out of the ES in accordance with Planning Inspectorate Advice Note 7 question 3, 5 and 6.

All priority habitats outside of designated sites are scoped out because the impacts would be avoided, mitigated or are not of a scale likely to generate significant effects.

Wet Woodland

7.4.89 Outside designated sites, there is only one known area of Wet Woodland priority habitat within the Order Limits. This is in the Cove Valley near to Farnborough (Section E), with approximately 0.4ha of Wet Woodland potentially directly affected. However, within this area, the construction corridor would be reduced and restricted to existing paths, where practicable. The felling of mature trees would also be avoided, where practicable. This embedded and good practice mitigation is outlined in Chapter 4 Design Evolution.

7.4.90 Elsewhere, Wet Woodland priority habitat is only known to be present alongside the A331 (Section E) and would likely be avoided as it is currently proposed to use trenchless construction techniques at this location. Any additional areas identified through field surveys that could not be avoided would be subject to good practice mitigation as outlined in Chapter 4 Design Evolution. There would therefore be no pathway for significant effects by habitat loss to arise to Wet Woodland priority habitat outside of designated sites and so this priority habitat is scoped out. This is in accordance with Planning Inspectorate Advice Note 7 questions 3, 5 and 6.

Protected and notable species

Great crested newts (GCN)

7.4.91 The following impact pathways of relevance to GCN have been identified:

- mortality and injury; and
- habitat loss/gain, fragmentation or modification.

7.4.92 GCN are not considered to be susceptible to disturbance-based changes to visual, acoustic or vibration stimuli and so this impact pathway is not considered here, as per Planning Inspectorate Advice Note 7 question 2.

7.4.93 The physical disturbance of GCN occupying terrestrial habitats is addressed by the two impact pathways identified above.

Mortality and injury

7.4.94 Construction activities such as topsoil stripping and vegetation clearance have the potential for mortality or injury to GCN when undertaken within suitable habitats within 250m of ponds confirmed to support this species. Baseline surveys confirm that there are GCN ponds within 250m of the Order Limits.

7.4.95 The route has been designed to avoid direct impacts to ponds and, where practicable, to reduce damage to 'core' habitats (i.e. woodland, hedges, rough grassland within 50m of GCN ponds). These areas have the greatest potential to support GCN (Natural England, 2015). However, baseline surveys confirm that there are GCN ponds within 50m of the route.

7.4.96 All works within 250m of GCN ponds with the potential to cause mortality or injury to these animals would be subject to well-established good practice mitigation measures (e.g. see English Nature, 2001). These would be secured and delivered through a European Protected Species Mitigation Licence (EPSML) granted by Natural England. A draft version of the licence application (hereafter referred to as a 'draft licence application') will be provided in support of the application for development consent. The content of the draft licence application would inform any 'Letter of No Impediment' (LONI) from Natural England.

7.4.97 Although no works with the potential for mortality or injury to GCN could take place without an approved mitigation strategy under an EPSML, it is not yet possible to scope out significant effects as the magnitude of the unmitigated impact is not fully understood. As such, this impact pathway is scoped in and considered in more detail in the ES.

Habitat loss/gain, fragmentation or modification

7.4.98 Good practice guidance advises that suitable habitats within 250m of a breeding pond are likely to be used most frequently by GCN if there is an absence of barriers to movement (English Nature, 2001). Small-scale losses of terrestrial habitat, especially over 250m from the breeding pond, are considered unlikely to have significant effects on GCN (Natural England, 2018). As such, it is considered that the effects of habitat loss and fragmentation would only be experienced within 250m of GCN ponds.

7.4.99 The results of GCN presence/absence surveys are not yet fully known although at least 25 ponds within 250m of the Order Limits are known to support GCN. There

would be no loss of GCN ponds as the Order Limits are sufficiently wide to ensure that all of the ponds within it can be avoided (it is proposed to avoid all ponds regardless of whether GCN are present or not). Effects to GCN habitats at all locations would be temporary and short-duration. It is expected that approximately 450m of pipe would be laid per week in rural areas. Effects would be reversible, with all habitats affected by construction reinstated after construction. As such, there would be no permanent loss of terrestrial habitat within 250m of GCN ponds. Refer to Chapter 3 Description of the Development for more information relating to the programme and a description of the development.

7.4.100 It is embedded mitigation that crossings of hedgerows and linear woodland belts would be reduced to 10m in width (see Chapter 4 Design Evolution). Replacement planting would take several years to re-establish to full maturity. However, a 10m wide gap would not prevent GCN crossing it as this species is capable of crossing large distances, including 'sub-optimal' habitats such as short pasture and arable fields (English Nature, 2001). Accordingly, the temporary topsoil stripping of a 30m (approx.) wide area in grassland and arable habitats would not stop GCN crossing it (although the presence of exclusion fencing used for GCN mitigation would be a temporary barrier to GCN dispersal). These habitats would also be reinstated within one growing season following completion of construction works.

7.4.101 However, the pipe trench could stop and trap migrating or moving GCN, with potential adverse effects being greatest within core habitat during the breeding season. As such, the effects of fragmentation would be scoped in to the ES if the pipe trench is likely to prevent GCN from returning to breeding ponds. Fragmentation effects associated with temporary habitat modification would be scoped out of the ES in accordance with Planning Inspectorate Advice Note 7 question 2.

7.4.102 All construction works affecting suitable habitat within 250m of GCN ponds would be reinstated. Opportunities for appropriate enhancements would also be sought on a site-specific basis (e.g. provision of refuge or hibernacula, and new hedgerow planting). Additional habitat enhancements, where practicable, could also be included in a Register of Environmental Actions and Commitments, for example pond enhancements, hedgerow and scrub planting.

7.4.103 Although no works affecting GCN habitat could take place without first delivering an approved mitigation strategy under an EPSML, it is not yet possible to scope out significant effects as the magnitude of the unmitigated impact is not yet fully understood. As such, this impact pathway is scoped in and considered in more detail in the ES.

Bats

7.4.104 The following impact pathways of relevance to bats have been identified:

- mortality and injury;
- habitat loss/gain, fragmentation or modification; and
- disturbance.

Mortality and injury

7.4.105 Tree felling required to enable pipe laying has the potential for mortality or injury to bats, should roosts be present. The threshold for significant effects would be if the impact would undermine the maintenance of the population of species at a

favourable conservation status in their natural range.

7.4.106 Where practicable, the Order Limits have been designed to avoid or reduce the need for tree felling. This has been achieved by reducing the width of the construction area from 30m (which would be the standard width in open areas) to 10m through hedgerows and tree lines (see Chapter 4 Design Evolution). The results of the ground-based roost assessments completed have been used to modify the Order Limits and construction techniques. Trees with moderate or high roost potential will be avoided, where practicable.

7.4.107 Trees with moderate or high potential to support bat roosts would be surveyed to confirm the presence or likely absence of bats before felling could commence (see Appendix 3). If roosts are confirmed these would be retained by moving the pipeline alignment within the Limits of Deviation where practicable.

7.4.108 The felling of any trees with confirmed bat roosts would be subject to good practice mitigation measures (e.g. see Mitchell-Jones, 2004). Full details of the mitigation would be provided in a draft licence application that will be submitted alongside the application for development consent. The content of the draft licence application would inform a LONI from Natural England.

7.4.109 Although no works with the potential for mortality or injury to bats could take place without first securing an approved mitigation strategy under an EPSML, it is not yet possible to scope out significant effects as the magnitude of the unmitigated impact is not yet fully understood. As such, this impact pathway is scoped in and considered in more detail in the ES.

Habitat loss/gain, fragmentation or modification

7.4.110 The felling of trees could result in the loss of bat roosts. Even if roosts are proven to be absent, the felling of the tree would result in the loss of a potential roosting resource within the local landscape. The unmitigated loss of important roosts, in particular those of rarer species (e.g. barbastelle or Bechstein's bat), could result in significant adverse effects.

7.4.111 The results of the ground-based roost assessments undertaken to date have been used to modify the Order Limits. Trees with moderate or high potential to support roosts will be avoided, where practicable. The results of further ground-based roost assessments to be undertaken in 2018 would also feed into the micro-siting of the pipeline alignment within the Limits of Deviation.

7.4.112 If it is not practicable to avoid the felling of moderate or high potential trees, surveys to confirm the presence or likely absence of roosting bats would be undertaken in accordance with the methodology described in Appendix 3.

7.4.113 As discussed above, if it is not practicable to avoid the felling of trees with confirmed bat roosts, these works would be subject to well-established good practice mitigation measures (e.g. see Mitchell-Jones, 2004). Details of the proposed mitigation would be provided in a draft licence application that will be submitted with the application for development consent. This mitigation would then be secured and delivered through an EPSML granted by Natural England.

7.4.114 Topsoil stripping and vegetation clearance would temporarily remove potential foraging habitat. However, these losses are not considered likely to be significant due to the temporary and localised nature of the impact. In addition, there are extensive

areas of alternative foraging resource in the wider landscape, even when the loss is considered cumulatively.

7.4.115 Linear features used by commuting bats would be temporarily severed to enable pipe laying. This would include hedgerows, riparian corridors and tree lines. Where practicable, effects to linear habitats would be mitigated by reducing the construction working area from 30m to 10m in width. All gaps would be re-planted with young specimens after construction.

7.4.116 It is considered very unlikely that a temporary 10m wide gap in a linear habitat would be sufficient to result in significant fragmentation effects to commuting bats, even if there is a roost feature present in the immediate vicinity. Most of the bat species recorded during the desk study are adept at crossing open habitats and would not likely be deterred by a 10m wide gap (e.g. common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, noctule *Nyctalus noctula*, serotine *Eptesicus serotinus*). Even *Myotis* and *Plecotus* species that mainly favour 'closed' habitats such as woodland are considered likely to cross a 10m wide gap where habitat continuity is maintained on both sides. Good practice, as described within Chapter 4 Design Evolution, would ensure that there would not be additional deterrents in the form of artificial lighting.

7.4.117 It is possible that bats commuting across temporary gaps would change their behaviour by flying closer to the ground. However, such changes in behaviour are considered unlikely to result in significant adverse effects as there would be no risk of collision with vehicles or other infrastructure.

7.4.118 Based on the above, it is considered that the effects of foraging/commuting habitat loss and fragmentation would be a very small magnitude of change and would have a negligible effect, even when considered cumulatively. Therefore, this impact pathway is scoped out, as per Planning Inspectorate Advice Note 7 question 3. However, the loss of roosts could result in significant effects, especially in areas where rarer species may be present and so this impact pathway is scoped in.

Disturbance

7.4.119 In accordance with Regulation 43 (1)(b) of the *Conservation of Habitats and Species Regulations 2017*, the threshold for significant disturbance to bats is considered to be '*disturbance which is likely to impair the ability of bats to survive, to breed or reproduce, or to rear or nurture their young; to hibernate; or to affect significantly the local distribution or abundance of the species to which they belong'*.

7.4.120 Given that good practice mitigation with respect to artificial lighting would avoid the illumination of habitat features that could be used by bats, disturbance caused by artificial lighting is scoped out of the ES, as per Planning Inspectorate Advice Note 7 question 1 and 3.

7.4.121 The only potential impact pathway that could significantly disturb bats is considered to be changes in noise and vibration affecting roosts in retained trees during the day. Such disturbance may cause bats to depart from their roosts early during daylight hours, increasing their exposure to predation. Hibernating bats may also be woken early. This would increase the energy they use which cannot easily be replaced. Their chances of surviving the winter would therefore be reduced (Mitchell-Jones, 2004). Roosts may also become temporarily unsuitable for use during the period over which disturbance occurs, resulting in a temporary loss of roost sites.

7.4.122 Appendix 8 provides more information relating to noise. At any one location, any increased construction noise and vibration levels would occur over a short duration as it is expected that approximately 450m of pipe would be laid per week in rural areas and approximately 90m per week in urban areas (see Chapter 3 Description of the Development). There would be days when no construction activities would be heard.

7.4.123 Pipe laying works would be mainly restricted to daytime activities. These would avoid the sensitive emergence and re-entry times for bats using retained roosts. Daytime works would also avoid disturbance during foraging periods when increased noise levels may affect foraging efficiency.

7.4.124 The results of ground-based roost assessments undertaken to date have been used to modify the Order Limits by avoiding known trees of moderate or high bat roost potential (and confirmed roosts). Ongoing surveys will continue to identify the location of trees with bat roost potential and/or confirmed roosts (see Appendix 3 for methods). Such trees would be retained by refining the pipeline route alignment within the Limits of Deviation, where practicable. These avoidance measures would reduce the potential for disturbance to bats in roosts by leaving as wide an area as possible between the tree and the construction works area.

7.4.125 Construction activity in the immediate vicinity of retained trees would be reduced as much as possible to avoid accidental damage to them, as outlined in Chapter 4 Design Evolution (these measures will form part of the CoCP). Potentially disturbing changes in noise levels to any tree roosts would therefore be restricted to very short periods (i.e. a few hours each day) when works are being undertaken close to the tree.

7.4.126 Despite the above, it is not yet possible to scope out disturbance to roosts as the baseline is not yet fully understood and disturbance of high-status roosts of rare bats could result in significant effects. As such, this impact pathway would be considered in more detail in the ES, as necessary.

Dormice

7.4.127 The following impact pathways of relevance to dormice have been identified:

- mortality and injury; and
- habitat loss/gain, fragmentation or modification.

Mortality and injury

7.4.128 Vegetation removal required to enable pipe laying has the potential to cause mortality or injure to dormice, should they be present. If the impact would undermine the maintenance of the population at a favourable conservation status in their natural range a significant effect would occur.

7.4.129 The route has been designed to avoid or reduce impacts to habitats suitable for dormice (e.g. hedgerows, woodland and scrub). There would be no loss of Ancient Woodland. The impact of hedgerow crossings would be reduced by decreasing the construction working area from 30m in width to 10m in width at hedgerow and boundary crossings. This would significantly reduce the risk of mortality or injury to dormice, should they be present.

7.4.130 All construction works affecting habitats that could support dormice would be subject to well-established good practice mitigation measures (e.g. see Bright et al, 2006). These would be secured and delivered through an EPSML granted by Natural England. Full details of the mitigation would be provided in a draft licence application that will be submitted with the application for development consent. The content of the draft licence application would inform a LONI from Natural England.

7.4.131 Although no works with the potential for mortality or injury to dormice could take place without first securing an approved mitigation strategy under an EPSML, it is not yet possible to scope out significant effects as the extent of the impact is not yet fully understood. As such, this impact pathway is scoped in and considered in more detail in the ES.

Habitat loss/gain, fragmentation or modification

7.4.132 This impact pathway would arise following the temporary removal of habitat used by dormice during the construction period. Hedgerow removal would be the main source of potential impacts.

7.4.133 Embedded mitigation would ensure that the construction works area would be reduced to 10m in width when crossing hedgerows and linear woodland belts. However, this localised, minor and temporary removal of habitat could prevent dormice from accessing nearby foraging resources, breeding or hibernation sites due to the fragmentation effect caused.

7.4.134 The removal of vegetation would be temporary with all gaps being re-planted on completion, as outlined in Chapter 3 Description of the Development. Additional habitat enhancements would also be secured and delivered through a Register of Environmental Actions and Commitments, for example hedgerow restoration in the local landscape.

7.4.135 Further field surveys and desk studies would be undertaken to identify those areas that would be subject to an EPSML. This would inform the need for, and design of, any further good practice mitigation required to avoid significant effects.

7.4.136 The impact to dormice is predictable and can be mitigated by reinstatement planting. However, it is not yet possible to scope out significant effects. This is because the possible distribution of dormice along the route is not yet known. The magnitude of the effect is, therefore, uncertain, especially when considered cumulatively. As such, this impact pathway with respect to dormice is scoped in to the EIA.

Badgers

7.4.137 The following impact pathways of relevance to badgers have been identified:

- mortality and injury;
- habitat loss/gain, fragmentation or modification; and
- disturbance

7.4.138 Badgers are common and widespread in lowland England, including the rural areas crossed by the Project (Roper, 2010). The *Protection of Badgers Act 1992* affords protection to badgers for welfare reasons and not because this species is of conservation concern, although this legislation still applies to activities associated with development.

7.4.139 Given their conservation status and the abundance of badgers within the local landscape, it is considered extremely unlikely that the Project could result in significant adverse effects to badgers. As such, this receptor is scoped out of the ES. This is in accordance with Planning Inspectorate Advice Note 7 questions 2 and 3.

7.4.140 Issues relating to badgers would be reported in a Protected and Legally Controlled Species Compliance Report that would be appended to the ES to demonstrate how legal compliance would be achieved. Where necessary, a draft licence application would also be provided to support the application for development consent.

Riparian mammals

7.4.141 Riparian mammals comprise the species of otter and water vole. The following impact pathways of relevance to riparian mammals have been identified:

- mortality and injury;
- habitat loss/gain, fragmentation or modification; and
- disturbance.

Mortality and injury

7.4.142 Mortality or injury of otters and water voles could arise during open trench excavation across watercourses supporting places of rest or shelter used by these species.

7.4.143 There are only limited records of otters and water voles within watercourses crossed by the Project. Surveys will be undertaken of all watercourses that would be directly affected by construction activity, as described in Appendix 3.

7.4.144 If water vole burrows or otter holts are confirmed within the Order Limits, impacts would be avoided by moving the route of the replacement pipeline within the Limits of Deviation or using an alternative construction technique, if practicable.

7.4.145 The construction working area at watercourse crossings would be reduced to a width of 10m. Any construction works that could not avoid water vole burrows would likely be subject to habitat displacement mitigation delivered under a Natural England Class licence and in accordance with good practice guidelines (Dean et al, 2016).

7.4.146 Any works affecting otter holts would be subject to a mitigation strategy secured and delivered by an EPSML granted by Natural England.

7.4.147 Licence applications would be supported by up to date baseline information. The proposed strategies would ensure the risk of mortality or injury to otters was appropriately mitigated. The details of all licensable mitigation would be provided in a draft licence application that will be submitted with the application for development consent. The content of the draft licence application would inform a LONI from Natural England.

7.4.148 Although no works with the potential to cause mortality or injury to riparian mammals could take place without first securing the relevant licence, it is not yet possible to scope out significant effects as the extent of the impact is not yet understood. As such, this impact pathway is scoped in and considered in more detail in the ES.

Protected species including GCN, bats, dormouse and riparian mammals is scoped in pending discussions with Natural England. Effects on badgers have been scoped out due to their conservation status and abundance.

Habitat loss/gain, fragmentation or modification

7.4.149 Riparian habitat suitable for otter and water vole could be temporarily affected during watercourse crossings.

7.4.150 As described above, any works within habitat known to support water vole would be subject to good practice mitigation delivered through a Natural England Class licence. Works affecting otter holts would be subject to mitigation secured through an EPSML. Full details relating to this mitigation would be provided in a draft licence application, as necessary.

7.4.151 Significant effects are not anticipated as a result of habitat fragmentation. All affected habitats would be reinstated, as outlined in Chapter 3 Description of the Development. There would be no permanent infrastructure within any watercourses that could act as barriers to dispersal. During and immediately following construction there would be a temporary 10m wide approx.) area within which riparian habitats would have been removed. The modification of habitat over such a small area is not considered likely to prevent riparian mammals from accessing habitats up or downstream of these locations. As such, the effects of fragmentation are scoped out of the ES, as per Planning Inspectorate Advice Note 7 questions 2 and 3.

7.4.152 Although no works directly affecting habitat used by riparian mammals (i.e. water vole burrows, nests or riparian vegetation, and/or otter holts) could take place without first securing the relevant licence, it is not yet possible to scope out significant effects as the extent of the impact is not yet understood. As such, this impact pathway is scoped in and considered in more detail in the ES.

Disturbance

7.4.153 Riparian mammals are considered susceptible to disturbance caused by noise or vibration during construction activities close to watercourses. It is considered that disturbance would only be likely to cause significant effects if burrows, nests or holts were affected during the breeding season.

7.4.154 Good practice mitigation secured by an appropriate Natural England licence would be implemented if riparian mammals would be subject to significant levels of disturbance. This will be detailed in a draft licence application provided with the application for development consent.

7.4.155 Although disturbance at any one watercourse crossing would be temporary and short-duration, it is not yet possible to predict the significance of any effects as the presence of riparian mammals is currently unknown. As such, this impact pathway is scoped in to the ES.

Breeding birds

7.4.156 The following impact pathways of relevance to breeding birds have been identified:

- mortality and injury;
- habitat loss/gain, fragmentation or modification; and
- disturbance

Mortality and injury

7.4.157 The mortality and injury of breeding birds could occur during all vegetation clearance activities and potentially during topsoil stripping, if ground-nesting species were present. Mortality and injury could occur to adults and dependent young and via destruction of eggs.

7.4.158 Good practice mitigation would be implemented by timing vegetation clearance works to avoid the main breeding season wherever practicable. An Environmental Clerk of Works (ECoW) would also supervise works affecting suitable nesting habitats during the breeding season. The working width would also be reduced to 10m through hedgerows, ditch boundaries, open cut watercourse crossings, and where trees are present. This mitigation would be secured through the CoCP, as set out in Chapter 4 Design Evolution.

7.4.159 Based on the implementation of good practice mitigation, there is a negligible risk of mortality or injury to breeding birds. Significant effects could not arise as a result of this impact pathway, either alone or cumulatively. As such, this impact pathway is scoped out of the ES. This is in accordance with Planning Inspectorate Advice Note 7 questions 3, 5 and 6.

7.4.160 A Protected and Legally Controlled Species Compliance Report would be provided as an appendix to the ES that would demonstrate how legal compliance would be achieved during the construction period.

Habitat loss/gain, fragmentation or modification

7.4.161 Habitat loss would occur during vegetation clearance and topsoil stripping required for construction.

7.4.162 The effects of habitat loss are expected to be limited as the affected habitats are abundant and widely available to breeding birds within the wider landscape (e.g. arable fields, hedgerows, woodland, trees and heathland). The removal of most habitats would be temporary in the short-term as habitats would be reinstated or enhanced. There would be a medium- or long-term impact associated with mature tree felling owing to the length of time replacement trees would take to reach equivalent maturity. However, felling mature trees will be avoided where practicable, and there would not be a significant reduction in trees as a result of the Project.

7.4.163 Habitat fragmentation is not predicted to result in significant effects due to the mobility of birds and the abundance of suitable alternative habitats within the immediate vicinity of the Order Limits.

7.4.164 Based on the above, the effects of habitat loss, modification or fragmentation is scoped out of the ES. This is in accordance with Planning Inspectorate Advice Note 7 questions 2 and 3.

Disturbance

7.4.165 Disturbance to birds associated with designated sites (e.g. the Thames Basin Heaths SPA) will be considered as part of the assessment for the respective site and is not

considered here.

7.4.166 Disturbance effects could occur due to changes in noise, vibration and visual stimuli during construction.

7.4.167 In extreme circumstances, disturbance of breeding birds could adversely affect the survival, range and abundance of certain species, although susceptibility to disturbance does vary between species, from total avoidance through to rapid habituation (e.g. see Latimer *et al*, 2003, and Cutts *et al,* 2009). For this Project, it is considered that only species that breed in retained habitats within, or immediately adjacent to, the Order Limits would be potentially susceptible to disturbance.

7.4.168 To mitigate the risk of disturbing any nesting birds listed under Schedule 1 of the *Wildlife and Countryside Act 1981* (as amended), good practice mitigation would be implemented, as set out in Chapter 4 Design Evolution, section 4.7, including by timing vegetation clearance works to avoid the main breeding season wherever practicable, and to reduced working widths through hedgerows and watercourses (see 7.4.158 above). Pre-construction surveys will be undertaken to inform the construction phase. This would likely involve pre-construction surveys of habitats considered likely to support nesting Schedule 1 species. In the event that a Schedule 1 species is found during the nesting season, Natural England would be consulted to identify and agree appropriate measures to be undertaken in respect of that species. This mitigation would be secured through the CoCP, as outlined in Chapter 4 Design Evolution.

7.4.169 As discussed above, the habitats that would be affected by construction are abundant in the wider landscape. This means that there is suitable alternative breeding habitat that birds displaced by disturbance could utilise.

7.4.170 Any effects of noise would be localised and temporary (short-term) and so are not likely to alter the long-term population status of any of the species or assemblages in the local area.

7.4.171 Based on the above, significant effects are not predicted as a result of this impact pathway and so this is scoped out of the EIA. This is in accordance with Planning Inspectorate Advice Note 7 question 3.

7.4.172 A Protected and Legally Controlled Species Compliance Report would be provided as an appendix to the ES that would demonstrate how legal compliance would be achieved during the construction period.

Common reptiles

7.4.173 The following impact pathways of relevance to common reptiles have been identified:

- mortality and injury; and
- habitat loss/gain, fragmentation or modification.

Mortality and injury

7.4.174 All activities that involve the clearance of areas containing suitable reptile habitat, or the tracking of machinery in such areas, could result in mortality and injury of these animals. The risk would increase in areas of known reptile presence and high potential reptile habitat, for example heathland.

7.4.175 There are some areas where construction of the Project would cross large expanses

of suitable reptile habitat, for example heathland, fields of rough grassland, and woodland rides. These areas have potential to support larger populations of reptiles due to their size and/or structure.

7.4.176 Field surveys focussing on these higher potential habitats would be undertaken in accordance with good practice guidelines (Froglife, 1999) and as described in Appendix 3. The results of these surveys would inform the design of mitigation that would avoid mortality or injury to reptiles, as outlined in Chapter 4 Design Evolution.

7.4.177 Remaining areas of suitable reptile habitat comprises narrow strips of habitat such as field margins and roadside verges. These habitats are expected to support low numbers of reptiles due to their limited size. These areas would not be surveyed (see Appendix 3) but would be subject to good practice mitigation in the form of habitat manipulation, fingertip searching and/or supervision by an ECoW (as outlined in Chapter 4 Design Evolution).

7.4.178 Despite the availability of good practice mitigation, it is not yet possible to scope out significant effects as the extent of the impact is not yet understood. As such, this impact pathway is scoped in and considered in more detail in the ES.

Habitat loss/gain, fragmentation or modification

7.4.179 The working area would typically be approximately 30m wide, although embedded mitigation would reduce the working width in sensitive habitats. Impacts to reptile habitats at all locations would be temporary and short-duration. It is expected that approximately 450m of pipe would be laid per week in rural areas (see Chapter 3 Description of the Development). Effects would be reversible, with all habitats affected by construction being reinstated on completion of construction. As such, there would be no permanent loss or fragmentation of reptile habitat.

7.4.180 Habitat enhancements in the form of reptile hibernacula and refuges would be created at suitable locations within the Order Limits. These enhancements would be secured and delivered through a Register of Environmental Actions and Commitments.

7.4.181 Based on the above, it is considered that the magnitude of change to reptile habitat would be negligible. Therefore, the proposed works would not result in significant effects arising from habitat loss, modification or fragmentation. As such, it is proposed to scope out this impact pathway. This is in accordance with Planning Inspectorate Advice Note 7 question 3.

Rare reptiles

7.4.182 The following impact pathways of relevance to rare reptiles have been identified:

- mortality and injury;
- habitat loss/gain, fragmentation or modification.

Mortality and injury

7.4.183 Rare reptile presence has been confirmed at specific heathland sites that would be crossed by the Project. There would be a risk of mortality or injury of these animals due to vegetation removal, topsoil clearance and the operation of machinery.

7.4.184 The Order Limits in these areas have been designed to reduce impacts to heathland habitat by following the line of existing paths and tracks. These areas are generally

unsuitable for reptiles as they have no vegetation and offer no shelter or protection. As such, construction works restricted to tracks and paths has a negligible risk of causing mortality or injury of rare reptiles.

7.4.185 In locations where construction activity would encroach into heathland habitat, survey work and/or consultation with relevant specialist stakeholders (e.g. SARG, Surrey Wildlife Trust, Natural England) will be undertaken. This would determine whether rare reptiles would likely be present at those specific locations.

7.4.186 If rare reptile presence was confirmed, all works with the potential to cause mortality or injury to these animals would be subject to plainly well-established good practice mitigation measures (e.g. see HGBI, 1998). This would be secured and delivered through an EPSML granted by Natural England. Full details of the mitigation would be provided in a draft licence application that will be submitted alongside the application for development consent. The content of the draft licence application would inform a LONI from Natural England.

7.4.187 Although no works with the potential to cause mortality or injury to rare reptiles could take place without first securing an approved mitigation strategy under an EPSML, it is not yet possible to scope out significant effects as the extent of the impact is not yet understood. As such, this impact pathway is scoped in and considered in more detail in the ES.

Habitat loss/gain, fragmentation or modification

7.4.188 The assessment relating to habitat loss, fragmentation or modification is as the same as that for common reptiles. It is considered that the magnitude of change to reptile habitat would be negligible and so the proposed works would not result in significant effects arising from habitat loss, modification or fragmentation. As such, it is proposed to scope out this impact pathway, as per Planning Inspectorate Advice Note 7 question 3.

Vascular and lower plants

7.4.189 The following impact pathways have been identified with respect to vascular and lower plants:

- habitat loss/gain, fragmentation or modification.

Habitat loss/gain, fragmentation or modification

7.4.190 *Arable weeds* – The Project passes through large areas of arable land. Although ground disturbance from construction works for the pipeline would favour the generation of arable weed species, construction could result in loss of habitat and individuals. This would lead to declines of arable weed species populations. There are records of several rare or threatened arable weed species within or immediately adjacent to the Order Limits. This is particularly the case south of Crondall, for example the priority species spreading hedge-parsley. There is a large area of arable land with a potential presence of these valuable species in a currently uncertain distribution within the construction footprint. There is therefore the potential for significant effects to arable weeds to result from pipeline construction and so this group of plants is scoped in to the ES.

7.4.191 *Floodplain plants* – The Project passes through a large area of the floodplain of the River Thames at Chertsey Meads LNR and Dumsey Meadow SSSI. Records indicate that although modified, the grassland habitat at these sites supports a range of

valuable plant species of floodplains. These include the nationally rare downy-fruited sedge at Chertsey Meads LNR known from around only 13 sites (Biological Records Centre, 2017). Also other locally important species such as marsh arrowgrass *Triglochin palustris* and strawberry clover *Trifolium fragiferum*. These valuable species are present but in a currently uncertain distribution. Therefore, there is the potential for significant effects to these valuable species through loss of habitat and populations during construction. This group of plants is scoped in to the ES but would be considered as part of the assessment for the respective designated sites that they are within.

7.4.192 *Heathland plants* – Heathland habitats, both wet and dry as well as acid grassland, support a range of valuable plant species. Many of these have been recorded from designated sites along the Order Limits. The nationally scarce Marsh clubmoss and Pale dog-violet, and others of local value such as Bristle bent *Agrostis curtisii*, are listed as features of designated sites such as Bourley and Long Valley SSSI. Other species typical of heathlands such as the locally scarce Sheep's-bit *Jasione montana* are not listed in site designations. There is potential for impacts to heathland habitat due to construction of the pipeline and the current distribution of value heathland species is uncertain. Therefore, there is the potential for significant effects to arise to heathland plant species, including through loss of habitat and populations. As such, this group of plants is scoped in to the ES.

Fish and other aquatic species

7.4.193 The following impact pathways have been identified with respect to fish and other aquatic species of conservation interest:

- mortality and injury;
- habitat loss/gain, fragmentation or modification;
- disturbance; and
- hydrological changes

Mortality and injury

7.4.194 The mortality and injury of fish and other aquatic biota could occur during watercourse crossings and could impact both adults and juveniles.

7.4.195 Good practice mitigation would be implemented, including where necessary and practicable, to agree the timing of watercourse crossing works with the EA, as outlined in Chapter 4 Design Evolution. Where fish and other important aquatic species are known at a crossing site, these species would be translocated ahead of watercourse dewatering under an appropriate EA licence.

7.4.196 Based on the implementation of good practice mitigation, it is considered that there is a negligible risk of mortality or injury of fish. Significant effects could not arise as a result of this impact pathway, either alone or cumulatively. As such, this impact pathway is scoped out of the ES. This is in accordance with Planning Inspectorate Advice Note 7 question 5 and 6.

Habitat loss/gain, fragmentation or modification

7.4.197 The crossing of watercourses using an open cut trenching technique would result in the potential for the temporary loss of in-channel habitat and fragmentation of local

populations of mobile aquatic flora and fauna (including cyprinid fish species). It would also result in the potential temporary severance of migratory pathways for European eel and salmonids.

7.4.198 Impacts would be reduced through the implementation of embedded and good practice mitigation, as outlined in Chapter 4 Design Evolution.

7.4.199 It is considered that there is a risk of habitat fragmentation for fish species and so significant effects could arise as a result of this impact pathway. As such, this impact pathway would be scoped into the ES.

Disturbance

7.4.200 The crossing of watercourses has the potential to result in disturbance of fish from the generation of noise/vibration/light and water quality changes. Fish are particularly sensitive to air and waterborne propagated noise. This may lead to avoidance responses in resident fish and act as an acoustic barrier to migratory species. Increases in suspended sediments may lead to smothering of prey and benthic habitats, effect respiratory function in clogging gills and reduce feeding efficiency.

7.4.201 Good practice mitigation outlined in Chapter 4 Design Evolution would be implemented on watercourses proposed to be crossed using open cut trenching. The width of the crossing would be reduced. Timing of the works to avoid key migratory periods where practicable would mitigate disturbance from noise, light or vibration to sensitive species present. This would be agreed with local EA fisheries officers on a watercourse-specific basis. Good practice pollution prevention measures, including sediment management, would ensure pollutants do not enter the wider environment.

7.4.202 Based on the implementation of good practice mitigation, it is considered that there is a negligible risk of disturbance on fish. As such significant effects could not arise as a result of this impact pathway, either alone or cumulatively. As such, this impact pathway is scoped out of the ES, as per Planning Inspectorate Advice Note 7 questions 5 and 6.

Hydrological changes

7.4.203 The crossing of watercourses using open cut trenching has the potential to affect the hydrological function of the watercourse. This would influence the distribution of aquatic flora and fauna and migratory pathways of key fish species. Severance of watercourses to allow in-channel works, including the redirection of riverine flow to allow access to the river bed, may result in modification to flow pathways. Hydrological changes are discussed in full in Chapter 8 Water.

7.4.204 The length of time for in-channel working would be reduced for watercourses to be crossed using open cut trenching, as outlined in Chapter 4 Design Evolution (these measures will form part of the CoCP for construction). Timing of the works to avoid key migratory periods where practicable would mitigate disturbance from noise, light or vibration to sensitive species present.

7.4.205 Based on the implementation of good practice mitigation and the potential for effect on geomorphological function, there is uncertainty over the likelihood of risk of hydrological changes on fish and other aquatic receptors. Significant effects could not be ruled out by this impact pathway, either alone or cumulatively. As such, this impact pathway is scoped into the ES.

Other notable species

7.4.206 The following impact pathways have been identified with respect to other notable species of conservation interest:

- mortality and injury;
- habitat loss/gain, fragmentation or modification; and
- disturbance.

7.4.207 Notable species that are discussed above (either as individual species or groups) or that are a qualifying or notable feature of a designated site are covered by the assessment above and so are not considered here.

7.4.208 The desk-study confirmed the presence or likely presence of a number of species that are listed on the Hampshire BAP or Section 41 of NERCA 2006, including brown hare, polecat, hedgehog, harvest mouse, yellow-necked mouse, pygmy shrew and water shrew and several species of invertebrate.

7.4.209 Notable species will be present within the landscape at various densities depending on their specific habitat requirements and the quality of the habitat present.

7.4.210 Brown hare will typically be restricted to arable fields and pasture, a habitat that is abundant within the landscape and readily restored post-construction. Brown hare is a highly mobile species and so will readily avoid plant and machinery during construction. Furthermore, young brown hare (leverets) are born in an advanced state of development and are capable of dispersing up to 100m a few days after their birth (Harris and Yalden, 2008). This reduces the risk of mortality or injury to the young. As such, it is considered unlikely that significant effects to brown hare would arise and so this species is scoped out of the ES. This is in accordance with Planning Inspectorate Advice Note 7 question 3.

7.4.211 If present within the Order Limits, polecat and hedgehog are predicted to occur in very low densities (e.g. the mean home range of polecat in Central Wales is 101ha; the mean home range for female hedgehog is 10ha (Harris and Yalden, 2008). Polecat are highly mobile and will readily avoid plant and machinery, and the risk of encountering dependant young is negligible. Hedgehog are less mobile, especially during the day when in nests or during the winter when in hibernation. However, the risk of mortality or injury to hedgehog (including through disturbance during hibernation) is considered to be very low based on good practice mitigation that would be implemented for protected species (e.g. fingertip searching hedgerows for dormouse or habitat manipulation for reptiles (see Chapter 4 Design Evolution). As such, it is considered unlikely that significant effects to polecat or hedgehog would arise and so these species are scoped out of the ES. This is in accordance with Planning Inspectorate Advice Note 7 questions 3 and 5.

7.4.212 Yellow-necked mice are considered likely to be present in all hedgerows and woodland within the Order Limits, with the possible exception of in urban environments. Within these habitats, Yellow-necked mice are expected to be abundant, with densities reaching 50 per hectare (Harris and Yalden, 2008). Given the status of this species in the south of England and the nature of the Project, significant effects to yellow-necked mice are not predicted. This species is scoped out of the ES, in accordance with Planning Inspectorate Advice Note 7 questions 2 and 3.

7.4.213 Harvest mouse and pygmy shrew may be present within long grass habitats, such as those alongside road verges, arable fields, hedgerows or watercourses. Water shrew may be present in the banks of watercourse or ditch crossings, and associated riparian habitats. These habitats are expected to be present in very localised areas only and would be fully reinstated on completion of construction. The likelihood of significant effects is therefore considered to be very low. As such, this species is scoped out of the ES in accordance with Planning Inspectorate Advice Note 7 question 3.

7.4.214 Notable species of invertebrate could be present in all habitats affected by construction of the Project. The majority of habitats recorded within the Order Limits are abundant within the local landscape and so temporary habitat loss would be unlikely to result in significant effects. All habitats would be reinstated on completion of construction. Mortality of invertebrates due to construction activities is not predicted to adversely affect the conservation status of any of the species concerned as the Project activities would be short-duration and would not present an ongoing impact that could affect entire populations. The likelihood of significant effects is therefore considered to be very low. As such, this group is scoped out of the ES in accordance with Planning Inspectorate Advice Note 7 question 3.

7.4.215 It is expected that significant effects to notable species (outside designated sites) would be unlikely to arise based on the general arguments presented above.

7.5 Impact Assessment Methodology

7.5.1 The impact assessment methodology would be informed by the CIEEM Guidelines (CIEEM, 2016) and would follow the approach described in Section 7.4 for the scoping of Likely Significant Effects. In addition to the methods described in Section 7.4, the following would also be applied.

Magnitude of change

7.5.2 The assessment of all scoped in receptors/impact pathways would include reference to the magnitude of change. In accordance with the CIEEM Guidelines, the magnitude of change would be determined making reference to the following characteristics, where relevant, to each effect:

- positive (beneficial) or negative (adverse);
- direct, indirect, cumulative;
- magnitude: size or amount of an impact, determined on a quantitative basis;
- extent: area measures and percentage of total (e.g. percentage area of habitat/ territory lost);
- duration: permanent or temporary in ecological terms (where differing timescales are determined in relation to the life-cycle of the receptor, these would be defined);
- reversibility: reversible or not reversible (can the effect be reversed, whether or not this is planned); and
- timing and frequency: important seasonal and/or life-cycle constraints and any relationship with frequency considered.

7.5.3 To provide consistency across chapters within the ES, the magnitude of change would be divided into four separate categories: ‘large’, ‘medium’, ‘small’ and ‘negligible’, as per Chapter 6 Impact Assessment Methodology.

7.5.4 The impact assessment would be undertaken for those receptors confirmed to have at least low value but with greater focus on receptors of at least medium value to provide a proportionate analysis. The criteria for determining value are presented in Table 7.4.

7.5.5 Table 7.6 provides descriptions of how the Table 7.4 parameters would be used to determine the magnitude of change for each predicted effect.

Table 7.6 Criteria for determining the magnitude of change for ecological receptors

Magnitude of change	Criteria
Large	The loss of receptor, reduction in quality and integrity of receptor coverage or population; severe damage to key characteristics, features or elements of the receptor; or large-scale or major improvement of receptor quality; extensive restoration or enhancement of the receptor; major improvement of receptor quality.

Magnitude of change	Criteria
Medium	The partial loss of receptor, but not adversely affecting its integrity; partial loss of/damage to key characteristics, features or elements of the receptor; or benefit to, or addition of, key characteristics, features or elements; or improvements of receptor quality.
Small	Some measurable change in attributes, quality or vulnerability to the receptor; minor loss of, or alteration to, one (or maybe more) key characteristic, feature or element of the receptor; or minor benefit to, or addition of, one (or maybe more) key characteristic, feature or element of the receptor; some beneficial effect on the receptor or a reduced risk of negative effect occurring.
Negligible	Very minor loss of, or detrimental alteration to, one (or maybe more) characteristic, feature or element of the receptor; or very minor benefit to, or positive addition of, one (or maybe more) characteristic, feature or element of the receptor.

Assessment of significance

7.5.6 In accordance with the CIEEM Guidelines, a significant effect is one that either supports or undermines biodiversity and/or conservation objectives for valuable ecological receptors.

7.5.7 The assessed degree of significance of effect is a function of a receptor's value and the potential magnitude of change caused by a given effect. To determine this, the guidance given in Chapter 6 Impact Assessment Methodology would be used, together with professional judgement. Only those effects considered likely to result in a 'moderate' or 'major' magnitude of change would be considered as significant. Those assessed as 'negligible' and 'minor' would be considered as non-significant effects. Where significant effects are predicted, additional mitigation would be applied to reduce the magnitude of the effects, where practicable.

7.5.8 Continued engagement with statutory advisors (e.g. Natural England and the Environment Agency) and key stakeholders (e.g. Local Planning Authority and South Downs National Park Authority ecologists, and the county Wildlife Trusts) would be undertaken throughout the assessment process to identify and address important constraints and enhancement opportunities.

7.6 Summary Scope for the EIA

7.6.1 A summary of receptors or impact pathways to be scoped in or out of the ES is provided in Table 7.7. This is based on the outcome of the assessment of Likely Significant Effects in Section 7.4. The table only includes receptors valued as low or greater. For each impact pathway, only those receptors that are potentially vulnerable to effects are listed.

Table 7.7 Matters of significance for ecology

Receptor	Matter / potential effect	Locations	Comments
Statutory designated sites	Habitat loss/gain, fragmentation or modification	• Thames Basin Heaths SPA • Thursley, Ash, Pirbright & Chobham SAC • Bourley and Long Valley SSSI • Chobham Common SSSI and NNR • Colony Bog and Bagshot Heath SSSI • Dumsey Meadow SSSI • Chertsey Meads LNR	Scoped in
		• Basingstoke Canal SSSI	Scoped out due to embedded mitigation (trenchless construction techniques)
	Species disturbance (from changes to noise, vibration, visual and light stimuli)	• Thames Basin Heaths SPA • South West London Waterbodies SPA • Solent and Southampton Water SPA and Ramsar site	Scoped in
	Hydrological change	• Thursley, Ash, Pirbright & Chobham SAC • Bourley and Long Valley SSSI • Chobham Common SSSI and NNR • Colony Bog and Bagshot Heath SSSI • Eelmoor Marsh SSSI • Dumsey Meadows SSSI	Scoped in
		• Solent and Southampton Water SPA and Ramsar site • Solent Maritime SAC • Upper Hamble Estuary and Woods SSSI • Basingstoke Canal SSSI	Scoped out due to embedded and/or good practice mitigation
	Air quality changes	All statutory designated sites	Scoped out due to good

Receptor	Matter / potential effect	Locations	Comments
	(resulting in habitat loss/modification) Introduction and spread of invasive non-native plant species (resulting in habitat loss/modification)		practice mitigation
Non-statutory designated sites	Habitat loss/gain, fragmentation or modification	• Brockwood Copse and Roadside Strips SINC; • Water Lane SINC; • Ewshot Meadows SINC; • Meadow near Soanes Copse SINC; • Wakefords Copse, Crondall SINC; • Pyestock Hill/Pondtail Heath SINC; • South of Ively Road SINC; • Cove Brook Grassland SINC; • Cove Valley, Southern Grassland SINC; • Blackwater Valley, Frimley Bridge SINC; • Frimley Hatches SNCI; • Frith Hill SNCI; • Frimley Fuel Allotments SNCI; • Land West of Littleton Lane SNCI; • Land West of Queen Mary Reservoir, Ashford Road SNCI; • Princes Lake West of Clockhouse Lane SINC; and • All other unidentified SINCs in Surrey within the Order Limits.	Scoped in
		• Maddoxford Farm Meadows SINC • River Thames SNCI	Scoped out due to embedded mitigation
	Hydrological change	All sites with sensitivities to hydrological changes (specific sites currently unknown)	Scoped in

Receptor	Matter / potential effect	Locations	Comments
	Disturbance	All sites within, or immediately adjacent to, the Order Limits that are designated due to the presence of species of fauna that are sensitive to disturbance (specific sites currently unknown)	Scoped in
	Air quality changes (resulting in habitat loss/modification); Introduction and spread of invasive non-native plant species (resulting in habitat loss/modification)	All non-statutory designated sites	Scoped out due to good practice mitigation
Ancient Woodland	Habitat loss/gain, fragmentation or modification; Introduction and spread of invasive non-native plant species (resulting in habitat loss/modification)	All Ancient Woodland locations	Scoped out due to embedded mitigation
Priority habitats outside designated sites (including hedgerows)	Habitat loss/gain, fragmentation or modification; Air quality change; and Introduction and spread of invasive non-native plant species (resulting in habitat loss/modification) Hydrological change is considered in Chapter 8 Water.	All priority habitat locations outside designated sites	Scoped out due to embedded and good practice mitigation and/or the predicted minor scale of any impact.
GCN	Mortality and injury;	All locations within 250m of ponds	Scoped in

Receptor	Matter / potential effect	Locations	Comments
	Habitat loss/gain, fragmentation or modification		
Bats	Mortality and injury; Habitat loss/gain, fragmentation or modification; and Disturbance	All locations requiring works that would potentially affect roosts	Scoped in
Dormice	Mortality and injury; Habitat loss/gain, fragmentation or modification	All locations requiring hedgerow or woodland removal within areas likely to support this species	Scoped in
Badger	Mortality and injury; Habitat loss/gain, fragmentation or modification; and Disturbance	All locations	Scoped out due to the predicted minor scale of any impact.
Riparian mammals	Mortality and injury; Habitat loss/gain, fragmentation or modification; and Disturbance	All locations requiring works affecting watercourses	Scoped in
Breeding birds	Mortality and injury; Habitat loss/gain, fragmentation or modification; and Disturbance	All locations outside statutory designated sites	Scoped out due to good practice mitigation and predicted minor scale of any impact.
Common reptiles	Mortality and injury	Specific locations with the potential to support medium or high populations	Scoped in
	Habitat loss/gain, fragmentation or modification	All locations	Scoped out due to predicted minor scale of any impact.
Rare reptiles	Mortality and injury	Specific heathland locations with known historic presence of rare reptiles	Scoped in

Receptor	Matter / potential effect	Locations	Comments
	Habitat loss/gain, fragmentation or modification	All locations	Scoped out due to predicted minor scale of any impact.
Vascular plants – arable weeds, heathland plants and floodplain plants	Habitat loss/gain, fragmentation or modification	Specific arable, heathland or floodplain locations with potential to support valuable species	Scoped in
Fish and other aquatics	Mortality and injury Disturbance	All locations	Scoped out due to embedded and good practice mitigation
	Habitat loss/gain, fragmentation or modification Hydrological change	All locations requiring works affecting watercourses	Scoped in
Other notable species	Mortality and injury Habitat loss/gain, fragmentation or modification Disturbance	All locations	Scoped out due to good practice mitigation and predicted minor scale of any impact.

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Chapter 8
Water

Scoping Report Volume 1

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8. Water

8.1 Introduction

8.1.1 This chapter describes the current environmental baseline for surface water and groundwater. It identifies the potential significant effects associated with the construction and operation of the Project on key receptors. The chapter then provides the proposed methods for assessing the likely significant effects and reporting on these within the Environmental Statement (ES). The chapter includes information regarding the following:

- Groundwater quality and resource;
- Surface water quality and resource;
- Fluvial geomorphology (including hydromorphology);
- Flood risk; and,
- Water Framework Directive (WFD) compliance.

8.1.2 The groundwater assessment considers the presence, movement, distribution and properties of water in soils and rocks, i.e. the water contained below the ground surface. Groundwater supports rivers, lakes and wetlands, especially through drier periods when there is little direct input from rainfall. Groundwater can be abstracted for supply. Rising groundwater levels can also lead to groundwater flooding.

8.1.3 Water quantity and quality have an important role in supporting flora and fauna in rivers, lakes and wetlands. Fresh surface water can be abstracted for water supply. Flooding from surface water features can have an adverse effect on structures and communities.

8.1.4 Fluvial geomorphology concerns landforms and the processes of erosion and deposition that shape and form river channels and adjacent floodplains. It is also specifically concerned with water and sediment movement in channels.

8.1.5 Aquatic and terrestrial ecology, including water dependent terrestrial ecology, are covered separately in Chapter 7 Biodiversity.

8.1.6 Chapter 11 Soils and Geology considers groundwater quality and human health aspects where there may be a potential contamination issue. All other water quality aspects are considered within this chapter.

8.1.7 A Water Framework Directive (WFD) Screening and Scoping Report has been prepared (Appendix 5.1). In line with Planning Inspectorate Advice Note 18, the WFD assessment is a separate assessment to the environmental impact assessment (EIA). Flood risk data is also included in Appendix 5.2.

8.1.8 This chapter has been written by technical experts in the fields of hydrogeology, fluvial geomorphology and flood risk assessment, all currently employed by Jacobs. They have the following academic qualifications and years of experience in the consultancy sector:

- Hydrogeologist: 15 years' technical experience; BSc (Hons) in Applied Geology; MSc Hydrogeology; Fellow of the Geological Society;
- Fluvial Geomorphologist: 6 years' technical experience; BSc (Hons) in Physical

Geography; MSc Integrated Management of Freshwater Environments; Chartered Water and Environmental Manager; and,

- Flood Risk Expert: 17 years' technical experience; BSc (Hons) in Earth Sciences; Chartered Water and Environmental Manager.

8.2 Key Legislation and Policy

Legislation

8.2.1 The key European legislation with respect to the water environment is the Water Framework Directive (WFD) (2000/60/EC). This document establishes a framework for the protection of surface waters and groundwater. The WFD is implemented in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

8.2.2 The key objectives of the WFD are to:

- prevent deterioration in quality status/potential (including individual quality elements) of WFD water bodies;
- achieve Good status/potential and Good surface water chemical status in water bodies by 2021, or 2027 where this is not possible;
- comply with objectives and standards for protected areas and priority species where relevant;
- reduce pollution from priority substances (as listed in the Regulations) by controlling discharges, emissions and losses of these substances;
- promote sustainable water use;
- prevent deterioration and enhance status of aquatic ecosystems and associated wetlands;
- reduce pollution of groundwater; and,
- contribute to mitigation of floods and droughts.

8.2.3 Other key UK legislation in relation to the water environment includes:

- Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009, which state under 5(2) (l) (iii) that the application must be accompanied by, where applicable, a plan with accompanying information identifying water bodies in a river basin management plan, together with an assessment of any effects on such sites, features, habitats or bodies likely to be caused by the Project.
- Water Resources Act 1991 which aims to maintain and improve the quality of controlled waters. Part II of the Act covers the licencing of surface waters and groundwater abstractions.
- Flood Risk Regulations 2009 require regulatory agencies to prepare flood risk and hazard maps, flood risk assessments, to identify flood risk areas and to prepare flood risk management plans.
- Flood and Water Management Act 2010 aims to create a simpler and more effective means of managing the risk of flooding and to help improve the sustainability of water resources. Provisions include the management of the risk of groundwater flooding.
- Environmental Permitting (England and Wales) Regulations 2016 (as amended) seek to ensure that authorised activities and their discharges do not endanger the environment or human health.

- Water Supply (Water Quality) Regulations 2016 set out standards (based on EU Directives) for the quality of water intended for domestic purposes or for use in a food production undertaking.

Policy

National Policy Statements

8.2.4 Overarching National Policy Statement for Energy (NPS) EN-1 sets out the policy for delivery of major energy infrastructure. It states that an assessment of water quality, water resources and the physical characteristics of the water environment should, in particular, describe:

- the existing quality of waters affected and the impacts on water quality. Note should be made of any relevant existing discharges and proposed changes to discharges;
- the existing water resources affected and the impacts on water resources. Note should be made of any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates. This includes any impact on or use of mains supplies and reference to Catchment Abstraction Management Strategies;
- the existing physical characteristics of the water environment (including quantity and flow) and any impact of physical modifications to these characteristics; and,
- any impacts of the Project on water bodies or protected areas under the WFD and source protection zones (SPZs) around potable groundwater abstractions. NPS EN-1 states that more weight will be given to impacts on the water environment where a project would have an adverse effect on the achievement of the environmental objectives established under the Water Framework Directive.

8.2.5 NPS EN-1 notes that where an energy project is greater than 1ha in area, located within Flood Zone 2 or Flood Zone 3 or subject to sources of flooding other than from rivers or the sea that a flood risk assessment will be required.

8.2.6 NPS EN-4 covers the specific energy sector of gas supply infrastructure and gas and oil pipelines. NPS EN-4 states generally that applicants should show how the proposal would be resilient to an increased risk of flooding due to climate change.

8.2.7 With specific reference to gas and oil pipelines, NPS EN-4 requires that impacts during construction on water quality, water resources and flood risk should be avoided as far as possible by route selection or mitigated if unavoidable. Where the project is likely to have effects on water resources or water quality, for example impacts on groundwater recharge or on existing surface water or groundwater abstraction points, or on associated ecological receptors, an assessment should be provided.

8.2.8 Whilst EN-1 and EN-4 remain the prime decision making documents, where they do not provide guidance, the following may also be considered important and relevant guidance that may require consideration by the decision making authority. At this stage it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State and it is included for completeness to allow the Secretary of State to make such a determination.

Local Plans

8.2.9 Each of the district and borough local authorities have a Local Plan, each at various stages of adoption and review (refer to Appendix 2 for details). Policies relating to the water environment are in accordance with the National Planning Policy Framework (NPPF). These Local Plan policies will be taken into consideration as part of the environmental assessment.

Environment Agency Groundwater Protection Policy

8.2.10 The Environment Agency sets out its policy position in relation to managing and protecting groundwater in The Environment Agency's Approach to Groundwater Protection (February 2018, Version 1.2). Section A (general principles) includes:

- *Wherever legislation allows, the Environment Agency will use a tiered, risk-based approach to regulate activities that may impact groundwater resources and to prevent and limit pollution.*
- *Where the potential consequences of a development or activity are serious or irreversible the Environment Agency will adopt the precautionary principle to manage and protect groundwater. The Environment Agency will also apply this principle in the absence of adequate information with which to conduct an assessment.*
- *The Environment Agency encourages everyone whose activities may impact upon groundwater to consider the groundwater protection hierarchy in their strategic plans when proposing new development or activities. The aim is to avoid potentially polluting activities being located in the most sensitive locations for groundwater.*

8.2.11 Section C Infrastructure states the following:

- *If national need for the provision and location of major developments overrides Environment Agency objections, the Environment Agency will raise its concerns and make every use of environmental impact assessment in addition to other measures to achieve environmental protection. Where developments receive approval against Environment Agency advice, it will apply section A - general protection position statements.*

8.2.12 Policy Position Statement C5 is particularly relevant to this Project, but noting the above statement regarding national need:

- *Policy Position Statement C5 – Pipelines and high voltage fluid filled cables: The Environment Agency will normally object to pipelines that transport pollutants, particularly hazardous substances, that:*
  - *pass through SPZ1 or SPZ2 where this is avoidable*
  - *are below the water table in principal or secondary aquifers.*

Where there is an existing or unavoidable need for pipelines or fluid filled cables to pass through SPZ1 or SPZ2, operators are expected to adopt BAT (Best Available Techniques) and operate in accordance with the Energy Networks Association guidance.

8.3 Baseline Conditions

Study Areas

8.3.1 The study area for surface water (including water quality, fluvial geomorphology, flood risk and WFD) is defined by a 500m buffer either side of the Order Limits (Figure 8.1). This study area may be extended as part of the ongoing assessment, to allow for a wider catchment understanding of the watercourses upstream and downstream of the Project. Where an extended study area is required, this would be identified and justified in the next stage of assessment.

8.3.2 The groundwater study area is defined as the Order Limits with a 1km buffer on either side. This buffer allows for the identification of receptors outside the location of the physical works. These could be impacted by activities such as change in groundwater levels caused by dewatering or disturbance (in flow and/or quality) of groundwater flows. These in turn may support receptors such as groundwater dependent terrestrial ecosystems (GWDTE) or provide baseflow to watercourses.

8.3.3 This groundwater study area is split further based on the geology and associated groundwater environment. Figure 8.2 shows the bedrock geology and Figure 8.3 shows the superficial (drift) deposits. The study areas are as follows:

- Groundwater Study Area A (GWSA-A): Route from Boorley Green in Hampshire to the southern boundary of the Chalk Principal aquifer at Bishop's Waltham covering part of Section A. This area passes over Palaeogene geological deposits which mostly form Secondary A aquifers.
- GWSA-B: Route that crosses the Chalk Principal aquifer from Bishop's Waltham to Crondall. This covers part of Section A and all of Sections B and C and a very small part of Section D.
- GWSA-C: Route from Crondall to Chertsey South, around 500m west of the M25. This covers most of Section D, all of Section E and most of Section F. This area passes over Palaeogene geological deposits which mostly form Secondary A aquifers, including the Bracklesham Group.
- GWSA-D: Route from Chertsey South to the West London Terminal storage facility covering a small part of Section F and all of Sections G and H. This area passes over Principal aquifers associated with superficial sand and gravel deposits.

Data Collection

Surface Water

8.3.4 The following baseline sources have been used during the scoping stage:

- Detailed River Network (geospatial data available from the UK Government open data website);
- Ordnance Survey 1:25,000 Explorer series mapping;
- Environment Agency 'Flood Map for Planning' (geospatial data available from the UK Government open data website);
- Risk of Flooding from Surface Water (RoFSW) mapping (available from Government open data website);

- Environment Agency 'Risk of Flooding from Reservoirs' (geospatial data available from the UK Government open data website);
- British Geological Survey Groundwater Flooding Susceptibility (geospatial data available from the UK Government open data website);
- Surrey County Council and Hampshire County Council Local Flood Risk Management Strategies (available via their respective websites);
- Strategic Flood Risk Assessments for Eastleigh Borough Council, Winchester City Council, East Hampshire District Council, Hart District Council, Rushmoor Borough Council, Waverley Borough Council, Guildford Borough Council, Woking Borough Council, Surrey Heath Borough Council, Runnymede Borough Council and Spelthorne Borough Council;
- Groundsure Report;
- Environment Agency 'Catchment Data Explorer' (2018);
- Aerial imagery; and
- Environment Agency 'Water Quality Archive' (available from the UK Government website).

Groundwater

8.3.5 Groundwater data have been collected from publically available sources. No site walkovers or ground investigations have been undertaken for the groundwater scoping assessment.

8.3.6 Geological data were used to determine the composition of the aquifers underlying the study area. 1:10,000 scale geological data for bedrock geology and superficial deposits were obtained from British Geological Survey (BGS) Digital Data under licence from Groundsure Ltd. The area between Alton and Frimley (Sections C, D and E) has no geological coverage at the 1:10,000 scale, therefore 1:50,000 scale data were also obtained from the BGS Web Map Service (www.bgs.ac.uk/data/services/wms.html).

8.3.7 1:50,000 scale Geological Permeability data were also derived from the BGS Web Map Service. This "Permeability Index" map provides a qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone (the zone between the land surface and the water table). The data indicate how fluid will migrate from the ground surface through the unsaturated zone of each rock unit. It has three classes: intergranular, fracture or mixed (intergranular and fracture). The Maximum Permeability and Minimum Permeability values indicate the range of flow rates likely to be found in the unsaturated zone for each rock unit. Five classes are used: very high, high, moderate, low and very low. They represent a likely permeability range immediately below the outcrop (rather than at any significant depth).

8.3.8 Aquifer designation data were obtained from the MAGIC website (http://www.natureonthemap.naturalengland.org.uk/home.htm) for bedrock and superficial aquifers. For both bedrock and superficial deposits, the following aquifer designations are defined.

- Principal aquifers: these are layers of rock or superficial deposits that have high

intergranular and/or fracture permeability. This means they usually provide a high level of water storage. They may support water supply and/or river baseflow on a strategic (regional) scale.

- Secondary A aquifers: these are permeable strata capable of supporting water supplies at a local rather than strategic scale. In some cases, they form an important source of baseflow to rivers.
- Secondary B aquifers: these are predominantly lower permeability layers which may store and yield limited amounts of groundwater. This is due to local features such as fissures, thin permeable horizons and weathering.
- Secondary Undifferentiated aquifers: this designation has been assigned in cases where it has not been possible to attribute either category A or B to a rock type.
- Unproductive Strata: these are rock layers or superficial deposits with low permeability that have negligible significance for water supply or river baseflow.

8.3.9 Groundwater level data have been obtained from published hydrogeology maps of the Principal Aquifers as published on the BGS website (www.bgs.ac.uk/research/groundwater/datainfo/hydromaps/hydro_maps_scanviewer.html) as follows:

- Hydrogeological Map of Hampshire and the Isle of Wight.

8.3.10 This map shows the groundwater level as mAOD (metres Above Ordnance Datum) during a period of low groundwater levels in 1973. As such, the data do not show directly how close the groundwater table is to the ground surface and whether the installed pipeline is likely to be below the groundwater table.

8.3.11 Data relating to the susceptibility of areas to groundwater flooding were obtained from BGS (www.bgs.ac.uk/research/groundwater/datainfo/GFSD.html). The data are based on geological and hydrogeological conditions and come with a range of resolutions. The data set used has an effective spatial resolution of about 50m by 50m. The dataset has three classes of groundwater flood susceptibility:

- A: Limited potential for groundwater flooding to occur;
- B: Potential for groundwater flooding of property situated below ground level; and
- C: Potential for groundwater flooding to occur at surface.

8.3.12 The susceptibility to groundwater flooding data have been used to assess where the groundwater table may be close to the ground surface, such that the pipeline may, particularly during times of high groundwater levels, be beneath the groundwater table.

8.3.13 Groundwater SPZs are defined for licensed public, potable water supplies and other abstractions used for a sensitive use such as food and drink manufacturing. A default inner protection zone (SPZ1) of 50m radius is also defined for unlicensed groundwater abstractions used for potable supply (those that abstract less than 20m^3/day). Groundwater SPZ data for licensed abstractions are available at the MAGIC website (www.natureonthemap.naturalengland.org.uk/home.htm) but this does not show the SPZs for the unlicensed abstractions. The following SPZs are defined:

- Inner zone (SPZ1): defined as the 50-day travel time from any point below the

water table to the source. This zone has a minimum radius of 50m.

- Inner zone, subsurface activity only (SPZ1c): extends SPZ1 where the aquifer is confined and may be impacted by deep drilling activities.
- Outer zone (SPZ2): defined by a 400-day travel time from a point below the water table. The previous methodology for defining SPZs gave an option to define SPZ2 as the minimum recharge area required to support 25 per cent of the protected yield. This option is no longer available in defining new SPZs and instead SPZ2 has a minimum radius of 250m or 500m around the source, depending on the size of the abstraction.
- Outer zone, subsurface activity only (SPZ2c): extends SPZ2 where the aquifer is confined and may be impacted by deep drilling.
- Total catchment (SPZ3): defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source. In confined aquifers, the source catchment may be displaced some distance from the source. For heavily exploited aquifers, SPZ3 can be defined as the whole aquifer recharge area where the ratio of groundwater abstraction to the average aquifer recharge is >0.75.
- Total catchment, subsurface activity only (SPZ3c): extends Zone 3 where the aquifer is confined and may be impacted by deep drilling activities.

8.3.14 Data relating to the location of groundwater abstractions are not available from publically available sources. However, the location of potable public water supplies can be inferred from the SPZ map. Groundwater abstraction data have been requested from the Environment Agency (for licensed abstractions) and the local authorities (for unlicensed abstractions, which are abstractions of less than 20m^3/day). At the time of writing, the data from the majority of local authorities are still to be received. Data were received from the Environment Agency, although there was insufficient time to include an appraisal of the data in this report.

8.3.15 Groundwater quality data have been obtained from the groundwater quality database maintained by the Environment Agency (www./data.gov.uk/dataset/water-quality-archive) and general groundwater quality for the main water bearing strata have been obtained from BGS published documents as follows:

- Baseline groundwater chemistry: The Chalk Aquifer of Hampshire. Open Report OR/09/052 (BGS, 2009).
- Baseline groundwater chemistry: The Palaeogene of the Thames Basin. Open Report OR/10/057 (BGS, 2010).
- Baseline Report Series: 15. The Palaeogene of the Wessex Basin. Groundwater Systems and Water Quality. Technical Report NC/99/74/15 (BGS, 2004).

8.3.16 Data to identify GWDTE were also obtained from the MAGIC website and from Hampshire Biodiversity Information Centre. A request to Surrey Biodiversity Information Centre has also been made but data have not yet been received. These data identify where the designated biological habitat sites are located. An assessment has been made using professional judgement as to how dependent on groundwater each site is. This has been based on natural settings (including topography), mapped water features and the identified sensitive species within the

site. The assessment determines the likely reliance of a site on groundwater to support the sensitive habitats. The initial determination of groundwater dependency has been divided into three classes of high, medium and low. It should be noted that further work will be undertaken to assess these sites, with site walkovers planned to determine the reliance of the sites on groundwater. Further details on the identification of sensitive habitats can be found in Chapter 7 Biodiversity.

8.3.17 General properties of the aquifers encountered within the study area have been obtained from the following BGS publications:

- The Physical Properties of Major Aquifers in England and Wales. British Geological Survey. Technical Report WD/97/34 (BGS, 1997); and
- The Physical Properties of Minor Aquifers in England and Wales. Technical Report WD/00/04 (BGS, 2000).

8.3.18 Under the WFD, groundwater bodies are defined and assessed in terms of water availability and water quality (called quantitative and chemical status respectively). For both criteria, each groundwater body is given a classification of either good or poor, with an overall groundwater rating of the lowest classification (so if the groundwater body has a classification of poor for either quantitative or chemical status, the overall groundwater body status is defined as poor). Data relating to these classifications have been obtained from the Environment Agency at www.environment.data.gov.uk/catchment-planning/ and are summarised in Appendix 5.1.

Groundwater Baseline

Groundwater Study Area A

Groundwater Resource

8.3.19 The Order Limits in GWSA-A cross the bedrock formations as shown in Table 8.1. Figure 8.4 (Sheet 1 of 4) and Table 8.1 show the aquifer designations for these deposits and the table also shows the Permeability Index as defined by the BGS and the value ascribed to these aquifers.

8.3.20 The Secondary A aquifers in this study area are formed by River Terrace Deposits and alluvium associated with watercourses to the north of Boorley Green (Figure 8.5, Sheet 1 of 4). The River Terrace Deposits are shown to have an intergranular Permeability Index of very high to high. The alluvium has an intergranular Permeability Index of high to very low. These superficial deposits are considered to be medium value groundwater receptors.

8.3.21 There is one known SPZ within the north-eastern end of the study area (Figure 8.6, Sheet 1 of 4). The majority of the London Clay Formation is of little significance as an aquifer, due to its mainly clay nature. However, the sandier upper part of the formation, especially the Whitecliff Sand Member, provides permeable horizons and the increased chance of a successful abstraction borehole with reported yields of around 500 m^3/day (BGS, 2004).

Table 8.1: Bedrock geology and aquifers within GWSA-A

Geological unit	Description	Aquifer designation	Permeability Index	Value of groundwater receptor
Wittering Formation (part of the Bracklesham Group)	These sedimentary rocks are detrital (formed from previous rock formations), comprising sand, silt and clay forming interbedded sequences.	Secondary A aquifer	Intergranular, high to low permeability	Medium
Whitecliff Sand Member (part of the London Clay Formation)	These sedimentary rocks are detrital, ranging from coarse- to fine-grained sand forming interbedded sequences. These are sandy horizons of the London Clay Formation.	Secondary A aquifer	Intergranular, high permeability	Medium
Durley Sand Member (part of the London Clay Formation)				Medium
London Clay Formation	These sedimentary rocks are detrital and dominantly comprise clay, with silt and sand forming distinctively graded beds.	Unproductive strata	Mixed moderate to very low permeability	Negligible
Lambeth Group	These sedimentary rocks are detrital, forming sand, silt and clay deposits.	Secondary A aquifer	Mixed moderate to very low permeability	Medium

8.3.22 Groundwater level data for GWSA-A are currently unavailable. However, it would be anticipated that groundwater levels are shallowest in the watercourse valleys, particularly for the tributary of the River Hamble in the vicinity of Ford Lake Valley (Section A). This is where the flood susceptibility map (Figure 8.7, Sheet 1 of 4) shows there is the potential for groundwater flooding at the surface. A further smaller area where there is susceptibility to groundwater flooding at the surface is present to the west of Bishop's Waltham (Section A), associated with a further tributary of the River Hamble.

8.3.23 In terms of WFD groundwater bodies, much of GWSA-A lies within the South East Hants Bracklesham Group groundwater body. This is shown to have good quantitative status and poor chemical, and therefore poor overall, status. A small length of GWSA-A in the extreme north crosses the East Hants Lambeth Group groundwater body which is shown to have poor quantitative status and good chemical status, with overall poor status. Further details, including a map showing the extent of the waterbody is available in the preliminary WFD assessment (Appendix 5.1).

Groundwater Quality

8.3.24 BGS (2004) indicates the most common water type encountered in the Palaeogene aquifer in the region is calcium bicarbonate type groundwater. These waters are generally fresh with low sodium and chloride concentrations but frequently with high iron and manganese concentrations and slightly acidic conditions with a pH between 6.2 and 7.3. Given the rural nature of the study area, human influence on groundwater quality is likely to be slight, although elevated agricultural pollutants (most notably nitrate) could be anticipated.

8.3.25 Data on the groundwater quality in the vicinity of GWSA-A have been obtained from the Environment Agency's water quality database. There is one monitoring point within GWSA-A at The Mount (NGR 452100, 115500 in Section A). This is situated on the Wittering Formation with small patches of superficial River Terrace Deposits locally. The data comprise three samples collected in 2006 and 2007. Generally, the data show the groundwater to be of good quality. Iron and manganese concentrations in the samples are not raised (the concentrations are around the analytical detection limit) and nitrate concentrations are relatively low (2.3 to 5.0 mg/l as N). The samples show low electrical conductivity (less than 0.2mS/cm), neutral pH (6.1 to 7.6 measured in-situ) and low concentrations of most metals such as lead (<0.002mg/l) and nickel (<0.005mg/l). Copper concentrations, at 0.023 to 0.055mg/l are slightly elevated. Pesticides and volatile organic compounds (VOCs) are absent.

Groundwater Dependent Terrestrial Ecosystems

8.3.26 An assessment of designated ecological sites along the route has identified that in GWSA-A, potential GWDTE as shown in Table 8.2 and Figure 8.8 (Sheet 1 of 4) are present. The Ford Lake Valley site is in an area identified to be susceptible to groundwater flooding which would indicate a high groundwater level and as such have a high groundwater dependency. The other site identified (Wintershill Floodplain) is likely to have a lower groundwater dependency.

Table 8.2 – GWDTE within GWSA-A

Site name	Nature conservation designation	Brief site description	Initial determination of groundwater dependency*	Value of groundwater receptor
Ford Lake Valley	Includes Maddoxford Farm Meadows SINC	Wet woodland and wet grassland/fen, potentially groundwater dependent. Narrow valley head susceptible to groundwater flooding, but no springs shown on OS maps.	High	Medium
Wintershill Floodplain	None	Habitat mapped as 'Coastal and Floodplain Grazing Marsh' priority habitat. Appears from aerial photography to be improved grassland. Low-lying area along stream susceptible to limited groundwater flooding.	Low	Low

* The dependency on groundwater is based on an initial desk study. Further assessment, following site walkovers, will be made which may alter this classification.

Groundwater Study Area B

Groundwater Resource

8.3.27 GWSA-B crosses the Chalk which forms a Principal aquifer (Figure 8.4, Sheet 2 of 4). There is a very small section in the vicinity of Alton passing over the Upper Greensand Formation which also forms a Principal aquifer. The Chalk in this area is at the ground surface or beneath superficial deposits (i.e. it is “unconfined” Chalk) and is a major source of drinking water in the area. Although chalk has a high porosity, the intergranular permeability is very low as the pores do not drain under gravity (BGS, 1997). Groundwater flow in the Chalk is therefore mainly controlled by fracture flow. The most important flow horizons are concentrated near the top of the Chalk. There is little flow deeper than 50m below ground level (mbgl) or 50m below the top of the Chalk where it is confined. Transmissivity (the product of aquifer permeability and aquifer thickness) within the Chalk tends to be greater in the valleys than in the interfluves (the land between the valleys of adjacent watercourses).

8.3.28 The BGS Permeability Index data describe the Chalk as having fracture flow with very high permeability. Karst features (a limestone landscape characterised by a dry and barren surface with underground drainage via channels with swallow holes, caves, large springs and other features) can be present in the Chalk. In hydrogeological terms the importance of karst is that groundwater is concentrated in, and flows rapidly through, a network of fractures, conduits (significantly enlarged

fractures) and caves, enlarged by the dissolving chalk. The extent of karst features in the Chalk near the Order Limits is still to be determined. However, BGS (1997) notes that in the River Alre catchment (in the vicinity of Section B), karstic flow has developed, resulting in very high yielding boreholes for the Chalk.

8.3.29 Due to the Chalk having a low effective porosity (i.e. the fractures), groundwater levels in the Chalk can vary greatly over the course of the year. This can be by as much as 20 to 30m with the highest seasonal water levels typically occurring in late winter or early spring. In general, the groundwater level is closer to the ground surface near to water courses than further away.

8.3.30 There are many springs in the Chalk. Those that occur on the dip slope of the Chalk are at the bottom of valleys where the water table intersects the surface (BGS, 1997). During the summer and autumn months, when the water table is falling, these springs dry up successively down the valley. In winter, as the water table rises, the springs become active at increasingly higher levels (these seasonal streams are known as “bournes”). In those catchments, where the Chalk groundwater remains connected with the watercourses year round, the Chalk groundwater provides baseflow to the watercourse. Such watercourses remain flowing all year.

8.3.31 The Upper Greensand Formation over which a small part of GWSA-B runs is defined in the BGS Permeability Index as having mixed flow type (intergranular and fracture flow) with high to moderate permeability.

8.3.32 Both the Chalk and Upper Greensand aquifers are considered to be high value groundwater receptors.

8.3.33 In terms of superficial aquifers, Principal and Secondary A aquifers are largely absent in GWSA-B. There is, however, a Secondary A alluvium aquifer associated with watercourses which cross the Chalk near Alton in Section C (Figure 8.5, Sheet 2 of 4). These deposits are shown to have an intergranular Permeability Index of very high to high and are considered to have a medium value as a groundwater receptor. Secondary Undifferentiated aquifers are more widespread, with head deposits associated with small streams forming these aquifers over much of the Chalk south of Alton. These deposits are shown to have an intergranular Permeability Index of high to very low and have a low groundwater receptor value. Clay with flint superficial deposits which are present within GWSA-B are defined as unproductive strata and have negligible value as a groundwater receptor.

8.3.34 The SPZ map (Figure 8.6, Sheet 2 of 4) shows SPZs throughout much of GWSA-B. In the south of the study area, the Order Limits cross an SPZ2 associated with an abstraction near to Bishop’s Waltham in Section A. The Order Limits then cross SPZ2s associated with abstractions near to New Alresford in the River Itchen and River Alre Valleys (Section B). SPZ1s are present within the 1km buffer groundwater study area associated with the abstraction near to Bishop’s Waltham and for two abstractions at Alton (Section C). SPZ1s have a high groundwater value, and SPZ2s a medium value.

8.3.35 Groundwater level data for the Chalk aquifer are shown on the historical hydrogeology map (BGS, 1979) to vary from 35mAOD on the southern Chalk boundary to 120mAOD in the vicinity of Alton. There is a regional groundwater flow direction from north to south in the southern portion of the Chalk (Sections A and B) and south to north in the northern portion (Section C). A series of springs emerge from the Chalk on its northern boundary with the adjoining Lambeth Group deposits. The Ashley Head Spring is present within the groundwater study area close to the village of Crondall (Section D). Further significant spring flows occur in the headwaters of the River Itchen and River Alre at New Alresford (Section B). These features show that groundwater is close to the surface at these locations at least on a seasonal basis.

8.3.36 The susceptibility to groundwater flooding map (Figure 8.7, Sheet 2 of 4) shows where shallow groundwater potentially occurs. This gives rise to the potential for groundwater flooding to occur at the surface or potential for flooding of property situated below ground level. This is the case:

- at the southern edge of the Chalk (Section A);
- in a valley known as Betty Mundy's Bottom (Section A),
- in the River Alre valley to the east of Bramdean (Section B),
- in the area of Alton associated with the Lavant and Caker Streams and River Wey (Section C),
- a small valley to the north of Bentley (Section C); and
- near the village of Crondall at the northern boundary of the Chalk (Sections C and D).

8.3.37 In terms of WFD groundwater bodies, the Chalk aquifer is split into four water bodies as shown in Table 8.3. Further details, including a map showing the location of the waterbodies are available in the preliminary WFD assessment (Appendix 5.1). The small section of Upper Greensand Formation crossed near Alton is included in the Alton Chalk groundwater body. The water quantitative and chemical status are also shown in this table.

Table 8.3: WFD Groundwater bodies within GWSA-B

Groundwater body	Quantitative status	Chemical status	Overall status
East Hants Chalk	Poor	Poor	Poor
River Itchen Chalk	Poor	Poor	Poor
Alton Chalk	Good	Good	Good
Basingstoke Chalk	Poor	Poor	Poor

Groundwater Quality

8.3.38 The natural groundwater quality of the Chalk shows water dominated by calcium bicarbonate. The water is generally of good quality and much of the water is suitable for public supply with minimal treatment. Human impact is most plainly visible in the distributions of nitrate (from agricultural inputs) in the groundwater which is high throughout the region (BGS, 2009). Due to the fracture flow and high permeability of

the Chalk, if contamination of the aquifer occurs there is rapid transport of contaminants with little attenuation. The absence of significant superficial deposits overlying much of the Chalk also means that the Chalk aquifer has high vulnerability to contamination from the ground surface. However, where clay with flints is present these deposits will give some protection to the underlying Chalk.

8.3.39 Data on the groundwater quality in the vicinity of GWSA-B have been obtained from the Environment Agency's water quality database. There are seven monitoring points within GWSA-B. There are a further eight situated on the Chalk and three on the Upper Greensand within 3.6km of the study area. Given the general absence of high permeability superficial aquifers in GWSA-B it is likely that all these monitoring points are measuring water quality in the Chalk or Upper Greensand. Generally, the data show the groundwater to be of good quality and dominated by calcium bicarbonate waters. Nitrate concentrations are typically 5 to 10 mg/l as N. However, one borehole to the east of Bramdean in Section B (NGR 467209, 125146) does record up to 13.9mg/l as N and another to the west of Bramdean (NGR 459251, 124780) up to 13.1mg/l as N. The samples show electrical conductivity of around 0.5 to 0.7mS/cm, and slightly alkaline pH at around 7.4 as measured in-situ.

8.3.40 Generally, concentrations of most metals such as lead and nickel are low. However, zinc concentrations are elevated at a number of locations with up to 9.11mg/l recorded in a borehole to the northeast of Upham in Section A (NGR 456321, 122899). Copper concentrations are also elevated in this borehole at up to 0.395mg/l. It is noted in BGS (2009) that some boreholes have groundwaters with relatively high concentrations of copper and zinc. This may be due to contamination from wellhead pipework rather than reflecting concentrations in the aquifer. Iron is occasionally recorded at elevated concentrations (up to 5.68mg/l). Pesticides and VOCs are generally absent. Relatively low concentrations of some herbicides such as atrazine and simazine are recorded in a few locations.

Groundwater Dependent Terrestrial Ecosystems

8.3.41 An assessment of designated ecology sites along the route over the Chalk has identified that in GWSA-B, potential GWDTE as shown in Table 8.4 and Figure 8.8 (Sheet 2 of 4) are present. Three sites have been identified with a moderate dependency and one with high dependency.

Table 8.4 – GWDTE within GWSA-B

Site name	Nature conservation designation	Brief site description	Initial determination of groundwater dependency*	Value of groundwater receptor
Peck Copse	SINC	Woodland described as wet ash-maple and base-rich springline alder wood. Large area around site mapped as susceptible to groundwater flooding. Springs shown on OS map.	High	Medium
Caker and Lavant Streams Floodplain	None	Habitat mapped as 'Coastal and Floodplain Grazing Marsh' priority habitat. Northern area appears from aerial photography to be improved grassland. However large area around site mapped as susceptible to groundwater flooding.	Moderate	Medium
Floodplain of River Wey	None	Habitat mapped as 'Coastal and Floodplain Grazing Marsh' priority habitat but appears from aerial photography to be improved grassland. Site straddles valley of the River Wey, the northern slope is steep with springs marked on OS mapping. Overlaps with an area susceptible to groundwater flooding.	Moderate	Medium
Ashley Head Spring	None	Habitat mapped as 'Coastal and Floodplain Grazing Marsh' priority habitat but appears from aerial photography to be improved grassland. A spring sources a small stream, but the area above stream looks dry. Overlaps with an area susceptible to groundwater flooding.	Moderate	Medium

* The dependency on groundwater is based on an initial desk study. Further assessment, following site walkovers, will be made which may alter this classification.

Groundwater Study Area C

Groundwater Resource

8.3.42 The Order Limits in GWSA-C cross the bedrock formations as shown in Table 8.5. Figure 8.4 (Sheet 3 of 4) and Table 8.5 show the aquifer designations for these deposits and the table also shows the permeability index as defined by the BGS and the value ascribed to these aquifers.

Table 8.5: Bedrock geology and aquifers within GWSA-C

Geological unit	Description	Aquifer designation	Permeability index	Value of groundwater receptor
Lambeth Group	These sedimentary rocks are detrital, forming sand, silt and clay deposits.	Secondary A aquifer	Mixed moderate to very low permeability	Medium
London Clay Formation	These sedimentary rocks are detrital and dominantly comprise clay, with silt and sand forming distinctively graded beds.	Unproductive strata	Mixed moderate to very low permeability	Negligible
Bagshot Formation (part of the Bracklesham Group)	These sedimentary rocks are detrital, forming coarse to fine grained sand deposits forming interbedded sequences.	Secondary A aquifer	Intergranular, high permeability	Medium
Windlesham Formation (part of the Bracklesham Group)	These sedimentary rocks are detrital, forming sand, silt and clay deposits forming interbedded sequences.	Secondary A aquifer	Intergranular, high to low permeability	Medium
Camberley Sand Formation (part of the Bracklesham Group)	These sedimentary rocks are detrital, forming coarse to fine grained sand deposits forming interbedded sequences.	Secondary A aquifer	Intergranular, high permeability	Medium

8.3.43 There are not many superficial deposits across GWSA-C. However, superficial deposits are present associated with the major river valleys. These are likely to be relatively thin deposits. In terms of superficial aquifers, medium value Secondary A aquifers are present in GWSA-C. These are formed by alluvium associated with the Cove Brook and with River Terrace Deposits and alluvium from the Blackwater River and Mill Bourne (Figure 8.5, Sheet 3 of 4). These deposits are shown to have an intergranular Permeability Index of very high to high. Locally, head deposits (clay, silt, sand and gravel) are found (classified as Secondary Undifferentiated aquifers with intergranular Permeability Index of high to very low) as well as head (sand and gravel) deposits (classified as Secondary A aquifers with intergranular Permeability Index of very high to high). Secondary Undifferentiated aquifers are of low value.

8.3.44 In the vicinity of Lightwater, locally the Surrey Hill Gravel Member (classified as a Secondary A aquifer with intergranular Permeability Index of very high to high) is crossed by the Order Limits. At Chobham Common the Order Limits cross small patches of the Taplow Gravel Formation (classified as a Secondary A aquifer with intergranular Permeability Index of very high to high). These are of low groundwater value. Peat deposits are also locally present (classified as unproductive strata with a mixed Permeability Index of low to very low) which are of negligible value in terms of groundwater resources.

8.3.45 The Lambeth Group outcrops for a short distance at the southern end of GWSA-C and this deposit is noted to have variable permeability. However, due to increased clay content, permeability decreases in the west of the deposit and borehole yields from the deposit are low (BGS, 2000). The majority of the London Clay Formation is of little significance as an aquifer, due to its predominantly clayey nature.

8.3.46 Of more importance to water supplies (for abstraction and to provide baseflow to watercourses) are the Bagshot and the Camberley Sand Formations associated with the Bracklesham Group. The Bagshot Formation provides groundwater supplies that are not large and abstraction is often severely limited by fine silt, easily mobilised from the formation. Measured borehole yields indicate that around 600 m^3/d may be obtained, but supplies of up to 150 m^3/d are more common. Springs occur at the junction with underlying clays (BGS, 2000).

8.3.47 Small supplies only are obtained from the Camberley Sand Formation with measured borehole yields of up to 50 m^3/d being common. Springs occur at the junction of the Camberley Sand Formation with the lower permeability Windlesham Formation. As a groundwater resource, the Camberley Sand Formation is considered secondary to the Bagshot Formation in the London Basin (BGS, 2000).

8.3.48 Beneath this section, the Chalk is present beneath the overlying bedrock (this section of the Chalk aquifer is known as the confined Chalk). However, the depth to the confined Chalk is considerable in GWSA-C. For example, a borehole log at Bourley Lane in Aldershot shows the Chalk to be at 141m depth and a borehole drilled at Alexandra Road in Farnborough (Section E) did not reach the Chalk despite being 79m deep. The Chalk is also overlain by low permeability London Clay deposits which will act as a confining layer for the Chalk groundwater. As such, excavations for the pipeline, even at the deepest river crossings, would not encounter the confined Chalk and a significant level of protection would remain.

8.3.49 The SPZ map does not show any SPZs to be present within GWSA-C (Figure 8.6, Sheet 3 of 4).

8.3.50 Groundwater level data for GWSA-C are currently unavailable. However, it is thought that groundwater levels are shallowest in the watercourse valleys. This is particularly for the tributary of the Blackwater River near Frimley Green (Section E), where the flood susceptibility map (Figure 8.7, Sheet 3 of 4) shows there is the potential for groundwater flooding of below ground property. A further smaller area where there is susceptibility to groundwater flooding at the surface is to the east of Frimley. Further shallow groundwater could be expected from Bagshot Heath to the east of Chobham Common (Section F). Here much of the route runs through areas susceptible to groundwater flooding at the surface or to below ground property.

8.3.51 In terms of WFD groundwater bodies, GWSA-C incorporates three water bodies as shown in Table 8.6 with further details, including a map showing the location of the waterbodies being available in the preliminary WFD assessment. The water quantitative and chemical status are also shown in Table 8.6.

Table 8.6: WFD Groundwater bodies within GWSA-C

Groundwater body	Quantitative status	Chemical status	Overall status
Old Basing Tertiaries	Poor	Good	Poor
Farnborough Bagshot Beds	Good	Good	Good
Chobham Bagshot Beds	Good	Good	Good

Groundwater Quality

8.3.52 BGS (2010) indicates that the most common water type found in the Palaeogene aquifer is calcium bicarbonate to calcium sulphate type groundwater. High levels of agricultural pollutants (most notably nitrate) are found in many areas. These waters are generally fresh with slightly acidic conditions with a pH of less than 7. Iron and manganese concentrations vary over a wide range, but high concentrations are shown to be present near to the Order Limits. Given the rural nature of much of the study area, human influence on groundwater quality (other than agricultural) is likely to be slight. although in the more urbanised areas groundwater contamination cannot be ruled out.

8.3.53 Data on the groundwater quality in the vicinity of GWSA-C have been obtained from the Environment Agency's water quality database. There are three monitoring points within GWSA-C with a further two within 1.4km. Groundwater and leachate quality data in relation to the Trumps Farm landfill site situated on the northern boundary of GWSA-C are also available (Section F). Given the general absence of high permeability superficial aquifers in GWSA-C, it is likely that all monitoring points are measuring water quality in the Bracklesham Group bedrock. The samples show electrical conductivity of around 0.2 to 0.4mS/cm, and slightly acidic pH at around 5.0 to 6.5 as measured in-situ.

8.3.54 Generally, concentrations of most metals such as lead and copper are low. However, nickel concentrations of up to 0.045mg/l and aluminium concentrations of up to 13.1mg/l have been recorded. Zinc concentrations are also elevated with up to 1.64mg/l recorded in a borehole at Camberley Heath Golf Club in Section F (NGR

489100, 159720). Pesticides and VOCs are generally absent.

8.3.55 The data collected around Trumps Farm landfill show that groundwater is potentially being impacted by landfill leachate, with elevated ammoniacal nitrogen being detected in one location.

Groundwater Dependent Terrestrial Ecosystems

8.3.56 An assessment of designated ecology sites along the route has identified that in GWSA-C, potential GWDTE as shown in Table 8.7 and Figure 8.8 (Sheet 3 of 4) are present. Eight sites with a potential high or moderate groundwater dependency have been identified.

Table 8.7 – GWDTE within GWSA-C

Site name	Nature conservation designation	Brief site description	Initial determination of groundwater dependency*	Value of groundwater receptor
Ewshot Grassland North and Ewshot Meadow	SINC	Priority habitats within SINC. 'Purple moor-grass and rush pasture' along a small stream, with 'Lowland Meadows' in the surrounding area. Records indicate botanically diverse damp grassland within and around the SINC. Habitat description and botanical assemblage consistent with habitats that can be fed by groundwater. Above stream in valley head and valley bottom would be consistent with groundwater seepage. Patchy presence of areas of groundwater flooding susceptibility.	High	Medium
Bourley and Long Valley	SSSI, SPA	Dry heath with *Agrostis curtissii*, e.g. H3, H4; wet heath, M16; woodland and scrub; and plantation forestry. Possibly valley mire in lower areas. *Lycopodiella inundata* a species of wet heath and edges of valley mires indicates seasonally wet conditions with peaty substrates. *Viola lactea* a species of dry heath. Other species indicative of mix of dry and wet conditions. M16 can be groundwater dependent, but dries in the summer. No overlap with groundwater flooding susceptibility area.	Moderate	High
Eelmoor Marsh	SSSI, SPA	Dry heath, wet heath and valley mire. Partially overlaps with groundwater flooding susceptibility area.	Moderate	High
Ively Road	Includes South of Ively Road SINC	Area of valley supplying Cove Brook, with wet woodland around Southwood Golf Club, and damp grassland to south of the road. Partially overlaps with groundwater flooding susceptibility area.	Moderate	Medium
Cove Brook	SINC	SINC designated for fen and wet woodland habitat. Given	High	Medium

Site name	Nature conservation designation	Brief site description	Initial determination of groundwater dependency*	Value of groundwater receptor
		situation, may be groundwater dependent, but not in a likely groundwater flooding susceptibility area.		
Blackwater Valley, Frimley Bridge	SINC	Wet woodland and ponds along River Blackwater may be groundwater dependent.	Moderate	Medium
Colony Bog and Bagshot Heath (known as Brentmoor Heath and Folly Bog Nature Reserve)	SSSI, SPA, SAC	Initial survey suggests valley mire with *Schoenus nigricans* and other mildly basicolous vascular plants and bryophytes, suggestive of M14 soligenous areas. Wider mire with abundant Sphagnum, and peat deposits, likely M21. Bryologically diverse. *Agrostis curtissii* heathland surrounding basin (H3). M14 is highly groundwater dependent. Northern end overlaps with groundwater flooding susceptibility area.	High in the northern end; moderate elsewhere	High
Chobham Common	SSSI, SPA, SAC	Two areas mapped as peat (BGS 10K) within valleys. The first, within unit 20, is artificially drained valley mire, supporting neutral grassland, regenerating mire and woodland. The second comprises units 22 and 23, with wet heath and remnants of mire and wet woodland. Overlaps with groundwater flooding susceptibility area.	High (unable to distinguish at the time of writing, areas which are high and those areas with lower groundwater dependency)	High

* The dependency on groundwater is based on an initial desk study. Further assessment, following site walkovers, will be made which may alter this classification.

Groundwater Study Area D

Groundwater Resource

8.3.57 GWSA-D has been defined based on the superficial deposits as these form a Principal aquifer. As such, in this length of the route the bedrock deposits may be of less importance than the superficial deposits in terms of the shallow groundwater. The Order Limits in GWSA-D cross the bedrock formations as shown in Table 8.8.

8.3.58 Figure 8.4 (Sheet 4 of 4) and Table 8.8 show the aquifer designations for these deposits. The table also shows the permeability index (as defined by the BGS) and the value of the groundwater receptor.

Table 8.8: Bedrock geology and aquifers within GWSA-D

Geological unit	Description	Aquifer designation	Permeability index	Value of groundwater receptor
Bagshot Formation (part of the Bracklesham Group)	These sedimentary rocks are detrital, forming coarse to fine grained sand deposits forming interbedded sequences.	Secondary A aquifer	Intergranular, high permeability	Medium
Claygate Member	These sedimentary rocks are detrital, forming sand, silt and clay deposits forming interbedded sequences.	Secondary A aquifer	Intergranular high to low permeability	Medium
London Clay Formation	These sedimentary rocks are detrital and mainly comprise clay, with silt and sand forming distinctively graded beds.	Unproductive strata	Mixed moderate to very low permeability	Negligible

8.3.59 Superficial deposits are extensive across GWSA-D and many of these deposits form Principal Aquifers, as shown in Table 8.9 and Figure 8.5 (Sheet 4 of 4). The gravel deposits are known collectively as the Lower Thames Gravel Aquifer and the gravels have a typical thickness of around 5m to 8m, but can be much thicker where they infill deep hollows.

Table 8.9: Superficial geology and aquifers within GWSA-D

Geological unit	Description	Aquifer designation	Permeability Index	Value of groundwater receptor
Alluvium Silt	Principally silt associated with river deposits. Mainly encountered in the vicinity of the River Thames.	Secondary A aquifer	Intergranular, high to very low permeability	Medium
Kempton Park Gravel Member	These deposits are detrital, forming sand, and gravel beds and lenses.	Principal aquifer	Intergranular very high to high permeability	High
Shepperton Gravel Member	These deposits are detrital, forming sand, and gravel beds and lenses.	Principal aquifer	Intergranular very high to high permeability	High
Lynch Hill Gravel Member	These deposits are detrital, forming sand and gravel beds, locally with lenses of silt, clay or peat.	Secondary A aquifer	Intergranular very high to high permeability	Medium
Head deposits	These deposits are detrital, of clay, silt, sand and gravel.	Secondary Undifferentiated aquifer	Intergranular high to very Low permeability	Low
Langley Silt Member	These deposits are detrital, forming clay and silt beds and lenses.	Unproductive strata	Intergranular low to very low permeability	Negligible

8.3.60 Beneath GWSA-D, the confined Chalk is present beneath the overlying bedrock. However, the depth to confined Chalk is considerable (for example, a log for a borehole at Staines Reservoir shows the Chalk being encountered at 88m depth and a log for a borehole in Stanwell as being 96m deep) and is overlain by low permeability London Clay deposits. These deposits will act as a confining layer for the Chalk groundwater. Excavations for the pipeline, even at the deepest river crossings, would not encounter the confined Chalk. A significant level of protection would therefore remain.

8.3.61 The SPZ map (Figure 8.6, Sheet 4 of 4) shows that the Order Limits cross SPZ2 associated with an abstraction about 1.2km to the north of the Order Limits (within Section G). It is understood that this abstraction is taken from the superficial deposits and the geology map would indicate that this could be the Shepperton Gravel

Member. However, this remains to be confirmed upon reviewing data from the Environment Agency on groundwater abstractions. SPZ2s are considered to have a medium groundwater value.

8.3.62 Groundwater level data for GWSA-C are currently unavailable. However, several flooded gravel pits are present within and around GWSA-D. Water in these pits is very likely to be connected to the groundwater in the surrounding gravel aquifers. This would indicate that groundwater is at a relatively shallow depth.

8.3.63 The groundwater flood susceptibility map (Figure 8.7, Sheet 4 of 4) shows there is the potential for groundwater flooding of below ground property and at the surface for much of the length of the route in GWSA-D (Section G). It is therefore anticipated that shallow groundwater levels would be encountered for almost the entire GWSA-D Order Limits, from the north of Addlestone to the West London Terminal storage facility (Sections G and H).

8.3.64 In terms of WFD groundwater bodies, the Chobham Bagshot Beds extend into GWSA-D associated with the bedrock aquifer. Section G then extends into the Lower Thames Gravels groundwater body This has good quantitative and chemical status and consequently has good overall status.

Groundwater Quality

8.3.65 Data on the groundwater quality in the vicinity of GWSA-D have been obtained from the Environment Agency's water quality database. There is one monitoring point close to GWSA-D at Chertsey (Section G, NGR 504660, 167660), located approximately 200m outside the GWSA-D boundary. This is situated on the boundary of alluvium and the Shepperton Gravel Member with Bagshot Beds beneath. It is uncertain what horizon the groundwater is obtained from, although the borehole name would suggest it is from the gravels.

8.3.66 The data comprise eight samples collected between 2000 and 2006. Generally, the data show the groundwater to be of good quality with electrical conductivity of around 0.6 to 0.7mS/cm, and slightly alkaline pH (7.4 measured in-situ). Orthophosphate concentrations are slightly raised, but there are low concentrations of metals. Pesticides and volatile organic compounds (VOCs) are generally absent, although the pesticides atrazine, simazine and permethrin have been detected.

8.3.67 Groundwater quality of GWSA-D may be impacted as a result of the urbanised nature of the area and the presence of various landfills and backfilled gravel pits (See Chapter 11 Soils and Geology for the location of landfills).

Groundwater Dependent Terrestrial Ecosystems

8.3.68 An assessment of designated ecological sites along the route has identified that in GWSA-D, potential GWDTE as shown in Table 8.10 and Figure 8.8 (Sheet 4 of 4) are present.

Table 8.10 – GWDTE within GWSA-D

Site name	Nature conservation designation	Brief site description	Initial determination of groundwater dependency*	Value of groundwater receptor
Addlestone Moor	None	Small, possibly unimproved meadows, possibly drained floodplain. Some records of plants indicative of damp grassland. Does not overlap with areas of high groundwater flooding susceptibility.	Low (although high uncertainty at this stage)	Low
Chertsey Meads	LNR	Limited information, but wet grassland may be present in some areas. Partial overlap with groundwater flooding susceptibility area.	Low	Low
Dumsey Meadow	SSSI	Calcareous and neutral grassland and wet grassland, and swampy areas in paleochannels. Overlaps with groundwater flooding susceptibility area.	Moderate	High

* The dependency on groundwater is based on an initial desk study. Further assessment, following site walkovers, will be made which may alter this classification.

Surface Water Baseline

8.3.69 The surface water study area contains many watercourses their corresponding catchments and adjoining catchments. The Order Limits cross 15 Main Rivers and 73 Ordinary Watercourses. The Main Rivers are:

- Ford Lake (Section A);
- Caker Stream (Section C);
- River Wey (Section C);
- Gelvert Stream (Section D);
- Ively Brook (Section D);
- Cove Brook (Section D);
- River Blackwater (Section E);
- Unnamed watercourse 44 (a tributary of the River Blackwater at Burrow Hill, Farnborough); (Section E)
- Hale Bourne (Section F);
- Unnamed watercourse 57 (a tributary of the Hale/Mill Bourne draining Chobham Common) (Section F);
- Chobham Park Brook (Section F);
- The Bourne (Section F);
- River Thames (Section G);
- River Ash (Section H); and
- Unnamed watercourse 85 (a tributary of the River Ash) (Section H)

Water Quality

8.3.70 Prior to the WFD, water quality was measured in watercourses using Environmental Quality Standards. These have since been replaced by the WFD quality elements. The WFD chemical quality has been referenced from the Environment Agency's Catchment Data explorer (2018). Appendix 5.1 and the WFD section below provide more detail on the WFD water bodies and the other supporting quality elements.

8.3.71 The data indicate that the Chemical Status is Good for all WFD water bodies that may potentially be impacted by the Project. This means all WFD water bodies achieve the Environmental Quality Standard (EQS) for all assessed Priority Substances and Priority Hazardous substances. Based on this information, all water quality receptors have been classified as having a High sensitivity/value.

8.3.72 In addition to the Catchment Data Explorer, the Environment Agency has a series of historical river quality monitoring points along key watercourses within the study area. These will be reviewed as part of the detailed baseline assessment in the ES.

8.3.73 There are several Drinking Water Directive protected areas within the study area. These include Drinking Water Safeguarded Zones for surface water following the River Wey from Alton through to the northern extent of the study area (SWSGZ4015 and SWSGZ4016). There are six Nitrate Vulnerable Zones for surface waters within

the study area: NVZ-S811, NVZ-S445, NVZ-S447, NVZ-S678, NVZ-S527 and NVZ-S810. Finally, the River Hamble falls within Eutrophic Waters area ET3 (Hamble Estuary).

Abstractions

8.3.74 The study area spans a number of Catchment Abstraction Management Strategy areas, namely, East Hampshire, The Wey, The Loddon and The Thames. There are several Environment Agency Assessment Points within these strategy areas. Considering the Q95 conditions on the watercourses within these areas, surface waters are mainly defined as having water available for licensing (i.e. they are not water resource stressed catchments).

8.3.75 Exceptions to this classification include the Wey at Assessment Point 5 which has restricted water available for licencing and the upper reaches of the River Hamble, River Meon, Loddon Assessment Point 5 and Thames at Kingston which have no water available for licensing.

8.3.76 Where available, records of licensed abstractions from surface water bodies will be reviewed as part of the detailed baseline assessment in the ES.

Discharges

8.3.77 Records of consented discharges to surface water bodies will be reviewed (where available) as part of the detailed baseline assessment in the ES.

Pollution Incidents

8.3.78 Information provided by the Environment Agency identifies several pollution incidents to surface waters within the study area:

- one Category 1 (Major) incident for the discharge of Oils and Fuels;
- ten Category 2 (Significant) incidents for Contaminated Water (4), Oils and Fuels (3), Organic Chemical/Products (1), Sewage Materials (1) and unidentified substances (1);
- one Category 3 (Minor) incident; and,
- two Category 4 (No impact) incidents involving Inert Materials and Wastes.

Fluvial Geomorphology

8.3.79 The route could potentially affect 94 watercourses and water features. These include 15 Main Rivers, 73 ordinary watercourses (comprising smaller watercourses and drainage ditches), two canals and four lakes.

8.3.80 Many of the ordinary watercourses are land or road drains. They typically have artificially straightened channel planforms with trapezoidal cross-sections. The banks are typically high and bed substrate consists of fine sediment. These watercourses usually have few sensitive or important morphological features, with limited morphological processes (such as erosion). Table 8.11 provides a summary of fluvial geomorphology sensitivity/value for receptors within the study area.

8.3.81 The WFD Scoping Assessment in Appendix 5.1, provides an overview of the watercourses within the study area and the geomorphological features noted from desk-study information.

Table 8.11 Fluvial Geomorphology Receptors

Receptor Name	Sensitivity/ Value	Description
River Wey (Section C)	High	Significant watercourses that show natural morphological forms and processes. Erosion and deposition noted on aerial imagery. Although the River Thames is modified in nature, it is also considered to have a High value
Hale Bourne (Section F)		
The Bourne (Section F)		
The River Thames (Section G)		
River Ash (Section H)	Medium	Watercourses that exhibit some morphological diversity, although channel modifications are present. These prevent natural processes from occurring
River Blackwater (Section E)		
Ford Lake (Section A)		
The Hatches (Section E)		
Caker Stream (Section C)	Low	Watercourses that are heavily modified but show some evidence on aerial imagery of morphological processes. Water features with some evidence of shoreline processes
Clappers Brook (Section F)		
Unnamed watercourse 5, 6 (Section A), 15, 87 (Section C), 22-24, 29, 30 (Section D), 44 (Section E), 53 (Section F), 57 (Section G), 77 and 85 (Section H),		
Ryebridge Stream (Section C)		
Chobham Park Brook (Section F)		
Cove Brook (Section D)		
Gelvert Stream (Section D)		
Water feature 1 (Section C)		
Staines Aqueduct (Section H)	Negligible	Watercourses that are either mostly artificial or have limited morphological value with limited processes and features
Intake Channel (Section H)		
Unnamed Watercourses 1, 2 (Section A), 8-14, 16-20 (Section C), 25-28, 31-32 (Section D), 34, 38, 42 and 84 (Section E), 45-51, 55-56 (Section F), 58-76 (Section G), 78 and 83 (Section H)		
Water Lane (Section C)		
Ively Brook (Section D)		
Basingstoke Canal (Section D)		
Water feature 3 (Section E) and 5 (Section H)		

Flood Risk

Fluvial

8.3.82 There are 15 Main Rivers that the Order Limits cross (see paragraph 8.3.67). A schedule of National Grid References (NGR) for the crossing points is available in Appendix 5.1. Figure 8.1 illustrates the location of these watercourses relative to the study area. Flood risk for these watercourses (and selected Ordinary watercourses) is defined by the Environment Agency 'Flood Map for Planning'.

8.3.83 The Environment Agency 'Flood Map for Planning' indicates that the study area passes through areas of Flood Zone 1, 2 and 3. The majority of the area (9,895 hectares (ha), 89.1%) lies within Flood Zone 1 (i.e. areas with less than 0.1% (1 in 1000) annual chance of flooding). Any area in a Flood Zone 1 is considered to be of Negligible sensitivity.

8.3.84 Flood Zone 2 is defined as areas with between 1% and 0.1% (1 in 100 and 1 in 1000) annual chance of flooding. Flood Zone 3 areas have a less than 1% (1 in 100) annual chance of flooding. The study area within Flood Zone 2 is approximately 1,215ha or 10.9%. Areas in Flood Zone 2 are considered to be of a Low sensitivity. Approximately 5.8% (642ha) of the study area lies within Flood Zone 3. Areas in Flood Zone 3 are considered to be of a Medium or High sensitivity. Table 8.12 provides a summary of flood risk sensitivity for all areas of Flood Zone 3 within the study area.

8.3.85 In addition to areas at risk from Main Rivers the study area also includes many Ordinary Watercourses. A schedule of these is also provided in Appendix 5.1 along with the NGR for the crossing points.

8.3.86 Flood risk associated with these Ordinary watercourses (where not covered by the Environment Agency 'Flood Map for Planning') and overland flow routes is best defined by the Environment Agency Risk of Flooding from Surface Water mapping.

Ordinary Watercourses and Surface Water

8.3.87 The Environment Agency Risk of Flooding from Surface Water mapping indicates that there are locations within the study area at risk of surface water flooding.

8.3.88 The majority of the study area (88.9%, 10,090ha) is at very low risk (less than a 0.1% (1 in 1000) annual chance of flooding. Locations where the study area crosses ordinary watercourses or are coincident with local depressions in topography at a high (greater than 3.3% (1 in 30) annual chance comprises 179ha ≈1.6% of the area. Areas defined as having a low (0.1% (1 in 1000) annual chance) risk cover approximately 1,020ha (≈9.2%). Typically, the risk is 'high' immediately next to all of the watercourses with varying extents of 'medium' and 'low' risk. This is dependent on the size of the watercourse and shape of the valley/depression. Local flow routes can be identified, particularly directed towards several of the watercourses. No major surface water flows were identified further away from the watercourse channels/valleys within the Order Limits.

Table 8.12 Flood Risk sensitivity for Flood Zone 3 watercourses

WFD Water Body	Flood Zone 3 Watercourse	Watercourse Designation	Flood Risk Sensitivity
Main River Hamble	-	-	-
Horton Heath Stream	Ford Lake	Main River	Medium
Upper Hamble	-	-	-
Itchen (Cheriton Stream)	Unnamed Watercourse 86 / Tributary of River Itchen east of Bramdean	Ordinary Watercourse	Medium
Meon	-	-	-
Arle	-	-	-
Caker Stream	Unnamed watercourse 7 / Lavant Stream	Ordinary Watercourse	Medium
	Caker Stream	Main River	Medium
North Wey (Alton to Tilford)	Unnamed watercourse 15 / Tributary of River Wey east of Neatham	Ordinary Watercourse	Medium
	River Wey	Main River	
	Unnamed watercourse 87 / Water Feature 1 / Tributary of River Wey east of Coldrey Farm	Ordinary Watercourse	Medium
Hart (Crondall to Elvetham	-	-	-
Fleet Brook	Gelvert Stream	Main River	Medium
Cove Brook	Unnamed watercourse 37 / Tributary of Cove Brook through Southwood Golf Course	Ordinary Watercourse	Medium
	Cove Brook	Main River	High

WFD Water Body	Flood Zone 3 Watercourse	Watercourse Designation	Flood Risk Sensitivity
Blackwater (Aldershot to Cove Brook confluence at Hawley)	River Blackwater	Main River	High
	Unnamed watercourse 44 / Tributary of Blackwater at Burrow Hill, Farnborough	Main River	High
Hale/Mill Bourne (Bagshot to Addlestone Bourne confluence near Chobham)	Hale Bourne	Main River	Medium
	Clappers Brook	Ordinary Watercourse	Medium
	Chobham Park Brook / Hale/Mill Bourne tributary draining Chobham Common	Main River	Medium
Addlestone Bourne (West End to Hale/Mill Bourne confluence at Mimbridge)	-	-	-
Chertsey Bourne (Virginia Water to Chertsey)	-	-	-
Chertsey Bourne (Chertsey to River Thames confluence)	Unnamed watercourse 68 / Tributary of The Bourne near St Peters Hospital, Runnymead	Ordinary Watercourse	High
	The Bourne	Main River	High
Thames (Egham to Teddington)	River Thames	Main River	High
Surrey Ash	River Ash	Main River	High
Portlane Brook	-	-	-

Flood Risk from Reservoirs

8.3.89 Environment Agency mapping provides an indication of areas at risk of flooding due to the failure of a reservoir. The only region of the study area identified to be within the extent of reservoir flooding is towards the north (Section H). This risk is associated with the West London Reservoirs, namely Queen Mary Reservoir, the Staines Reservoirs, King George VI Reservoir, Wraysbury Reservoir and Queen Mother Reservoir. The extent of flooding associated with these reservoirs covers the northernmost 7.5km (approximately) of the study area.

Flood Risk from Groundwater

8.3.90 The British Geological Survey Groundwater Flooding Susceptibility data identifies the majority (8,257ha, 68.8%) of the study area to be characterised by geology with '*a limited potential for groundwater flooding*'.

8.3.91 Few parts of the study area have *'potential for groundwater flooding of property situated below ground level'* (1,001ha, 8.3%) or '*potential for groundwater flooding to occur at the surface*' (1,993ha, 16.6%%). Typically, these characterisations are present in the valleys of watercourses and/or in lower lying areas such as

- the valley of the River Hamble (and its tributaries) (Section A);
- the River Wey from south of Alton to Bentley (Section C);
- the headwaters of the River Hart near Crondall (Section D);
- Farnborough near Cody Technology Park (Section D);
- the Blackwater Valley (Section E);
- Chobham Common (Section F); and
- the River Thames Valley floor (Section G).

8.3.92 The remaining 6.3% of the study area has not been assessed for its susceptibility to groundwater flooding.

Other Flood Sources

8.3.93 Other notable flood sources within the study area include the Basingstoke Canal, Staines Aqueduct (King George VI Aqueduct) and Queen Mary Reservoir intake. Flood risk from these features specifically are not defined and will require further investigation as part of the detailed baseline assessment in the ES.

8.3.94 It is likely that there is water supply and sewerage infrastructure within the study area especially where the Project passes through developed areas. Where this infrastructure is present the associated flood risk from these sources is expected to be low. Further investigation will be required to confirm if this is the case.

8.3.95 Where such infrastructure is absent risks will be negligible.

Water Framework Directive

8.3.96 There are a total of 39 surface WFD water bodies and 10 groundwater WFD water bodies within the study area. Appendix 5.1 provides a detailed overview of the WFD screening and scoping stages. Figures 8.9 and 8.10 illustrate the WFD surface water bodies and groundwater bodies respectively.

8.3.97 From the WFD Scoping Report, a number of the surface WFD water bodies have been scoped out of further assessment. This is based on distance to the Order Limits and the likelihood of potential long-term effects. As a result, 14 surface WFD water bodies and 10 groundwater WFD water bodies have been identified for assessment. Further information can be found in Appendix 5.1.

8.3.98 The following provides a summary of the WFD water bodies scoped in for further assessment:

- Surface WFD water bodies:
  - 1 achieving Bad Status/Potential.
  - 4 achieving Poor Status/Potential.
  - 8 achieving Moderate Status/Potential.
  - 1 achieving Good Status/Potential.
- Groundwater WFD water bodies:
  - 6 achieving Poor Status.
  - 4 achieving Good Status

Influence of Climate Change

8.3.99 Over the medium and long term, climate change could potentially affect the hydrological and hydrogeological regimes of the study area. The UK Climate Impact Programme indicates that in the future winters may be generally wetter and summers substantially drier for the whole of the UK. The direct effect of climate change on surface water and groundwater depends primarily upon the change in the intensity, volume and seasonal distribution of rainfall. Drier, warmer summers could lead to reduced flows in watercourses while more intense rain storms in the summer months could give rise to more rapid runoff and result in localised flooding and affect water quality. Similarly, an increase in rainfall volume, particularly in winter when it falls on saturated soils, could give rise to prolonged periods of flooding over much larger

areas than is currently the case.

8.3.100 Increased frequency/severity of droughts and floods could potentially lead to watercourses adjusting to different patterns of erosion and deposition. The adjustment would most likely be localised. It would be of relatively low magnitude for each of the low sensitivity watercourses due to their modified nature and low slope (corresponding to low energy). For the higher sensitivity watercourses, this could mean further adjustment in channel alignment and features in the future.

8.3.101 The direct effect of climate change on groundwater resources would be complex and depend primarily upon the change in the volume and distribution of groundwater recharge. If drier, warmer summers lead to the seasonal deficits in the moisture content of soils extending into the autumn, the winter groundwater recharge season may be shortened. This could be compensated, at least to some extent, by an increase in winter rainfall. However, aquifers are recharged more effectively by prolonged steady rain, which continues into the spring, rather than short periods of intense rainfall, which often result in a high proportion of rapid surface runoff rather than infiltration.

8.3.102 The effects of climate change on groundwater in the UK therefore may include a long-term decline in groundwater storage; increased frequency and severity of groundwater droughts; higher groundwater levels leading to increased frequency and severity of groundwater-related floods; and mobilisation of pollutants due to seasonally high water tables.

8.3.103 The Project is taking account of the likely effects of climate change in the water assessments.

8.4 Likely Significant Effects

8.4.1 This section makes reference to PINS Advice Note 7 *Environmental Impact Assessment: Process, Preliminary Environmental, Information and Environmental Statements* (December 2017), and in particular the list of information to be provided when considering scoping out aspects and matters as listed in Chapter 1 Section 1.4:

8.4.2 A WFD Scoping Report is provided (Appendix 5.1) which summarises the potential effects identified on WFD water bodies within the study area.

8.4.3 Decommissioning activities would be subject to an appropriate decommissioning strategy, as per Chapter 3 Description of the Development. It is not practical to assess the effects of decommissioning at this stage as the methodology and good practice mitigation measures will not be defined until closer to the time, likely to be at least 60 years from now. As such, the effects of decommissioning is scoped out of this assessment.

Groundwater

Construction

8.4.4 Effects on groundwater during construction of the pipeline could include the following:

- Changes to groundwater recharge rates. This could be from the removal of vegetation and shallow soils. This in turn could impact on groundwater levels and lead to changes in the groundwater flow direction and associated groundwater discharge points. The working area for construction is relatively small in relation to the scale of the aquifers being crossed. Rainfall would naturally percolate through the soils (albeit it at a likely lower rate). Based on this, any effects if they were to occur would likely be negligible. As such, this effect is scoped out of the assessment based on Planning Inspectorate Advice Note 7 question 3 as it is unlikely to lead to significant effects.

Groundwater recharge rate changes scoped out as effect would be of small scale and unlikely to lead to significant effects

- Interception of shallow groundwater in the pipeline trench which could lead to the reduction of flows to shallow groundwater receptors such as springs, watercourses and GWDTE. Over much of the aquifer, this is unlikely to have a significant effect. This is because the trench constructed to lay the pipeline is shallow (typically the top of the installed pipe would be 1.2m deep but deeper under certain features) and is unlikely to penetrate any significant thickness of saturated aquifer. Areas where groundwater is most likely to be encountered are those areas shown on the susceptibility to groundwater flooding maps as having the potential for groundwater flooding at the surface. Near the sensitive receptors, effects could be significant and would need to be determined on a site-by-site basis. This would be particularly in GWDTE with high or moderate groundwater dependency. This effect is therefore scoped out of the assessment for much of the length of the route based on the receptor being unlikely to be sensitive to the potential effect, and at a scale unlikely to be significant (Planning Inspectorate Advice Note 7 questions 2 and 3). However, in the vicinity of the following, an assessment of effects will be included in the EIA:

- all GWDTE with national or international designations or GWDTEs with local or no designations that have high or moderate groundwater dependency;
- where there are shallow groundwater supplies used for private unlicensed abstractions, including spring discharges; and
- where the trench runs parallel to a water course where shallow groundwater may be contributing to the watercourse along a considerable length.

Reduction of flows in shallow groundwater is only scoped in for
- GWDTE,
- shallow groundwater used for private abstractions; and
- where the Project runs parallel to a watercourse.

- Interception of shallow groundwater in the pipeline trench which could lead to groundwater of poor quality discharging to sensitive receptors. These include GWDTE or watercourses where the trench crosses a watercourse. Over much of the aquifer, this is unlikely to have a significant effect as the trench constructed to lay the pipeline is shallow (typically the top of the installed pipe would be at 1.2m depth). It is therefore unlikely to penetrate any significant thickness of saturated aquifer. Areas where poor quality shallow groundwater is most likely to be encountered are those areas shown on the susceptibility to groundwater flooding maps as having the potential for groundwater flooding at the surface and in urbanised areas. This is most likely in GWSA-D where a large number of landfills are present and groundwater is shown to be shallow. An assessment of the available groundwater quality data in this area in the shallow Principal aquifer deposits does not show significant contamination. However, the data set is limited to six samples from one location. This effect is therefore scoped out of the assessment for much of the route based on Planning Inspectorate Advice Note 7 questions 1 and 3. This is based on there not being a pathway to the receptor or where there is a pathway it is unlikely to be at a scale where significant effects could occur. For area GWSA-D, where the level of uncertainty over groundwater quality is high, assessment is scoped in.

Poor quality groundwater discharging to sensitive receptors will be scoped out except for GWSA-D due to uncertainty over groundwater quality.

- At trenchless crossings there is potential that excavations for access shafts and the bores themselves required for the pipes could connect two aquifers that are currently not connected. For example, if the bores went through a clay layer between two aquifer units. This could lead to cross contamination of an aquifer. This aspect will be considered on a case-by-case basis for each trenchless crossing point within the EIA following further desk study and the collection of ground investigation data.
- Changes to groundwater quality from the removal of vegetation and disturbance of ground. This could lead to exposed soils which in turn could lead to greater leaching of natural substances in the soils. Migration of these dissolved contaminants could then affect:
  - the quality of groundwater in the aquifer;

- water used for drinking water or other uses; or
- the quality of groundwater discharging to surface waters, including water discharging to GWDTE.

The working area for construction is relatively small in relation to the scale of the aquifers being crossed. The rainfall would naturally percolate through the soils (albeit it at a likely lower rate), leading to leaching of natural substances. Therefore, any effects that occur would likely be negligible. As such, this effect is scoped out of the assessment based on Planning Inspectorate Advice Note 7 question 3, as it is unlikely to be at a scale which would cause significant effects. This assessment excludes historical contaminated land or landfill sites which are considered in Chapter 11 Soils and Geology.

Exposed soils leading to leaching of natural substances into groundwater will be scoped out.

- Changes to groundwater quality from the removal of vegetation and disturbance of ground. This could lead to increased suspended solid concentrations in the groundwater. Migration of suspended solids could then affect the quality of groundwater in the aquifer and water used for drinking water or other uses. It could also affect the quality of groundwater discharging to surface waters, including water discharging to GWDTE. Due to the filtering effect of the unsaturated zone and aquifer material, suspended solids would not migrate to any significant extent in intergranular aquifers or Unproductive strata. On the basis that there is unlikely to be a pathway to these receptors, and that where such a pathway exists it is unlikely to be at a scale to cause significant effects for these deposits, this effect is scoped out (Planning Inspectorate Advice Note 7 questions 1 and 3). However, for aquifers with fracture flow, particularly for flow in aquifers with karstic features, suspended solids can move significant distances and rapidly. This could occur for trenched sections of pipeline, particularly where superficial deposits overlying the Chalk are thin or absent. This could also be for trenchless crossings if the tunnelled borings intercepted fractures or karstic features. Therefore, for the unconfined Chalk aquifer, the effect of suspended solids is included in the scope of the EIA.

  Increased levels of suspended solids into groundwater will be scoped out except for the unconfined Chalk aquifers. This is on the basis that the suspended solids would not move very far in intergranular aquifers.

- Changes to groundwater levels and groundwater flow direction caused by temporary groundwater dewatering activities during construction of shafts at trenchless crossings. A reduction of groundwater levels could then lead to the following.
  - Groundwater levels falling in GWDTE, so that the flora and fauna that rely on groundwater are affected. Where GWDTE are near to shafts to be dewatered, these is included in the scope of the EIA.
  - A reduction in groundwater discharging to surface watercourses such that flows in the watercourses are reduced or there is a reversal of flow from the

river into the aquifer. Where watercourses are close to shafts to be dewatered, these are included in the scope of the EIA.

- Wells and boreholes which are relied upon for water supply to dry out or yields to be reduced. Where groundwater abstractions (both licensed and unlicensed) are close to shafts to be dewatered, these are included in the scope of the EIA.
- Settlement of the ground beneath buildings such that the building integrity is threatened. It is usually excessive differential settlement that causes damage to buildings. However, uniform settlement may still cause problems where services (e.g. sewer pipes) enter the structures. Where buildings are near to shafts to be dewatered, these are included in the scope of the EIA.

The effects of dewatering are scoped in where there may be impacts on shallow groundwater receptors, including GWDTE, watercourses, shallow groundwater abstractions and buildings.

This aspect will therefore be included in the EIA assessment although some bedrock aquifers in certain areas are scoped out on the above basis.

- During dewatering works, in locations where there are no suitable watercourses to receive abstracted groundwater, discharge to ground could result in changes to groundwater quality if dissimilar groundwaters are mixed. Also contaminants, such as hydrocarbons, could enter the abstracted water from machinery such as pumps. The effects on groundwater quality for the discharge of groundwater back to ground will therefore be included in the scope of the EIA. Depending on the recharge method, sediment could also enter the groundwater system. The use of mitigation measures, such as settlement lagoons or other appropriate treatment, would remove the silt and this is scoped out of the assessment (Planning Inspectorate Advice Note 7 questions 1 and 3).

Discharge of groundwater back to the ground and effects on water quality are scoped into the EIA.

Movement of sediment would be prevented by mitigation and so will be scoped out.

- The recharge of abstracted groundwater from dewatering could also cause the groundwater level to rise and the groundwater flow direction to change. This could then lead to local groundwater flooding to occur. It could also lead to discharges to areas where groundwater is currently not discharging, potentially affecting sensitive locations. The effects on groundwater flow and levels for the discharge of groundwater back to ground will therefore be included in the scope of the EIA.

The effects of recharge of abstracted groundwater back to the ground will be included in the scope.

- Changes to groundwater quality from leaks and spills from chemicals, fuels and oils from construction plant or materials used in the construction of the pipeline, including materials containing cement. This includes the storage of such materials, including fuel storage areas in construction compounds. Contamination of the groundwater itself can then lead to effects on groundwater abstractions. This could include public water supplies, watercourses which are in hydraulic connection with groundwater and water within GWDTE. Given the mitigation measures that would be used to reduce this impact which will be included in the CoCP, this is scoped out of the assessment (Planning Inspectorate Advice Note 7 questions 5 and 6). This scoping out excludes areas where the Order Limits pass through a GWDTE.

Changes to groundwater quality from leaks and spills would be mitigated by good practice measures included in the CoCP. This excludes GWDTE areas which are scoped in.

Operation

8.4.5 Effects on groundwater during the operation of the pipeline could include the following:

- Changes to groundwater flow direction or levels due to the below ground pipeline and other below ground structures. The pipeline could provide a barrier to groundwater flow which could lead to changes in groundwater level. There would then be the potential for changes to groundwater discharge points. The actual pipeline would be relatively narrow (with an internal diameter of around 30cm) and would be above the groundwater table for much of its length. Aquifers that are exploited or provide significant flow to secondary receptors such as watercourses and GWDTE would be significantly thicker than the pipeline. On this basis this effect is scoped out of the assessment based on Planning Inspectorate Advice Note 7 questions 1 and 3. Other below ground structures such as the valve chambers would be relatively small compared to the aquifers as a whole. They would not significantly affect groundwater flow if they were below the groundwater table.

Changes to groundwater flow direction from the presence of below ground structures are scoped out.

- Changes to groundwater flow direction due to the below ground pipeline. If the pipeline is surrounded with a permeable gravel, this could provide a pathway for migration of groundwater. This could then lead to groundwater being drained from one area leading to a reduction in groundwater level or changes to groundwater discharge points. However, mitigation incorporated into the design would prevent long lengths of pipeline with a gravel surround. This would comprise water stops (or “stanks”) through the bedding and side fill at intervals along the pipeline. As such this effect is scoped out of the assessment based on Planning Inspectorate Advice Note 7 questions 5 and 6 except for areas where the pipeline passes through or close to a GWDTE

Changes to groundwater flow direction from the presence of gravel surround in the pipe trench is scoped out except for areas in the vicinity of GWDTE.

where it would have potential to affect key features, such as peat bogs, in the long term.

- Changes to groundwater quality due to potential leaks of aviation fuel from the pipeline. This could then lead to effects on groundwater supplies, including public water supplies if the leak occurs within a SPZ, and water within GWDTE. Any leaks would have greatest impact where the groundwater table is shallow. This would mean that the installed pipeline would be below the groundwater table, either permanently or at times of high groundwater level. In this case, a leak could directly enter groundwater with nothing to reduce the effect. In addition, where the pipeline would be above the water table, but in an aquifer with very high or high permeability in the unsaturated zone, leaks could move rapidly to the water table. This would be particularly where there is fracture flow and/or karstic features. Where the pipeline was installed in unproductive bedrock or superficial strata or in Secondary Undifferentiated aquifers, groundwater would be unlikely to be impacted by leaks due to the low permeability. These areas are therefore scoped out of the assessment based on Planning Inspectorate Advice Note 7 questions 1 and 2. All other aquifers would be included in the scope of the EIA (the confined Chalk present in GWSA-C and GWSA-D are, however, scoped out).

Effects on groundwater quality from potential leaks during the operation of the pipeline are scoped in for most areas, although areas where there is low permeability the effect is scoped out.

Surface Water

Construction

8.4.6 Where the Project would take place in rural areas with no positive drainage system (i.e. ditches, watercourses, rivers etc.) the potential for the construction works to impact on surface water quality is limited (i.e. there is no pathway). Any dewatering activities in such areas would be discharged to ground (down the local hydraulic gradient) and are discussed further in the above section on groundwater.

8.4.7 Where construction activities would interact directly with watercourses there is the potential for them to impact on water quality. Such instances could arise from construction activities within watercourses and their catchments or where dewatering activities discharge to a surface water receptor. Impacts could arise from the introduction of contaminants such as chemicals and/or suspended sediment.

8.4.8 Compaction of ground and installation of temporary haul roads, accesses and lifting platforms also has the potential to increase runoff and suspended sediment, as does the storage of material in the floodplain and direct runoff from construction areas.

8.4.9 Mitigation measures to address these risks would include the establishment of pollution prevention guidelines which will be included in the CoCP. These would include measures to segregate construction site runoff from natural catchment runoff, treatment (where necessary) prior to discharge and the appropriate storage and handling of substances hazardous to the environment.

The assessment of the construction impacts on surface water quality is scoped in to the EIA

8.4.10 The assessment of the construction effects of the Project on surface water quality is

scoped in to the Environmental Impact Assessment.

Fluvial Geomorphology

8.4.11 Effects of construction on fluvial geomorphology could include:

- Changes in sediment load leading to changes in sediment processes, smothering of the channel bed substrate and subsequent effects on species and habitats;
- Changes to the flow regime in receiving watercourses, altering stream power as a result, to the detriment of channel stability;
- Localised loss of riparian vegetation as a result of vegetation clearance for pipe crossing construction;
- Potential for erosion of the channel bed and banks following an open cut trench crossing or haul road crossing if the channel is not reinstated sufficiently. The interaction of flows with the backfilled trench could cause preferential erosion or the creation of a knickpoint;
- In-channel working leading to damage and disturbance of morphological features e.g. channel banks, deposits, bed, and compaction of bed materials; and
- Temporary crossing structures such as culverts for haul roads and access tracks altering bank stability, vegetated riparian corridor and geomorphological features.

8.4.12 The works associated with the construction of the watercourse crossings would be temporary. The reinstatement of the channel cross-section and vegetated riparian corridor following open cut crossings would be key to ensuring that there are no significant effects following construction. Generally, with the implementation of good practice mitigation which will be included within the CoCP, it has been determined that it is unlikely that there would be any significant effects as a result of construction activities (Planning Inspectorate Advice Note 7 questions 5 and 6).

With good practice mitigation eliminating significant effects on the geomorphology, the effects of construction at watercourse crossings has been scoped out.

8.4.13 Haul roads and access tracks are likely to be considered as permanent for the purposes of assessment as they could be in place for more than a month. This could lead to potential longer term effects as a result of modification to the watercourses. This could alter in-channel morphological features and lateral/longitudinal connectivity. These would therefore need to be assessed for each receptor to determine the appropriate methodology and if mitigation is required.

The effects of haul roads and access tracks on the geomorphology are included within the scope of the EIA.

8.4.14 The assessment of the construction effects of the Project on fluvial geomorphology is scoped in to the Environmental Impact Assessment for the Medium and High sensitivity receptors and those crossed by haul roads/access tracks. It is anticipated that open cut crossings on the Low sensitivity receptors and any directional drilled crossings would not have any geomorphological features that could be significantly impacted. Therefore, with the temporary nature of the construction works, these receptors are scoped out of further assessment (Planning Inspectorate Advice Note 7 questions 5 and 6).

The effects of the construction impacts of the Project on geomorphology are included in the EIA for the most sensitive receptors. Low sensitivity receptors are scoped out.

Flood Risk

8.4.15 Where the Project would take place in areas with no flood risk, the potential to increase flooding would be negligible (i.e. no flood source). Despite this, mitigation measures during construction would include those commonly associated with well managed sites. Measures such as stockpiling materials in such a manner so as to ensure surface water could not “pond” (leading to the creation of a flood source) and managing surface water that accumulates within the working area and discharging to approved points in a controlled manner.

8.4.16 The following areas would be scoped out of the assessment:

- areas within the Order Limits characterised as lying within Flood Zone 1;
- areas of very low risk from surface water flooding;
- outside areas of reservoir flood risk; and,
- on an aquitard or areas assessed to present no groundwater flood risk.

8.4.17 This would be based on assumptions of no flood source, and surface water managed by a competent contractor communicated through a Flood Risk Assessment and a Construction Environmental Management Plan (CEMP) to be approved by the developer and the regulators. As such, this effect is scoped out of the assessment based on Planning Inspectorate Advice Note 7 questions 5 and 6.

Areas where there is no flood source or the flood source is of low sensitivity, are scoped out of the assessment.

8.4.18 Similarly, it is proposed that areas will also be scoped out where

- the site lies within Flood Zone 2 and/or the 0.1% to 1% AEP surface water flood extent;
- where the depth of flooding in areas with a surface water flood risk of 3.3% annual chance (1 in 30) is less than 300mm;
- where areas of surface water flood risk are geographically isolated (i.e. not connected overland), and
- areas with a limited potential for groundwater flooding and the risk of flooding from reservoirs results in less than 300mm of flood water.

8.4.19 This is on the basis of the flood source being of low sensitivity. It would also be the responsibility of a competent contractor to manage appropriately in accordance with a Flood Risk Assessment and CEMP. As such, this effect is scoped out of the assessment based on Planning Inspectorate Advice Note 7 questions 5 and 6.

8.4.20 However, there is the potential for temporary effects on flood risk where:

- the construction works coincide with areas of Flood Zone 3 and areas of surface water flooding for the 3.3% to 1% AEP events where depths are greater than 300mm;
- there is a potential for groundwater flooding to below ground structures; and
- the surface and reservoir flooding generates depths greater than 300mm.

8.4.21 Instances of this occur throughout the Order Limits. In addition to the potential for temporary loss of floodplain, construction activities could also temporarily divert flood flow pathways exposing new areas to flooding.

8.4.22 As set out in Chapter 4 Design Evolution (Section 4.7), the CEMP will set out the water mitigation and management measures and where they will need to be used. These measures will include, but not be restricted to:

- construction activities to be located outside of the floodplain as much as possible (i.e. avoid stockpiling materials in the floodplain); and
- where necessary, appropriate measures would be implemented to mitigate for any loss of floodplain storage volume during temporary construction works.

8.4.23 Areas of the greatest concern with regards to the loss of floodplain storage during temporary construction works would be within existing developed areas where displacement of floodwater could potentially increase risks to people and property.

8.4.24 In rural areas where displaced floodwater has the potential to be naturally attenuated by the floodplain downstream, mitigation measures are unlikely to be required during temporary construction works, as in this scenario there would be no receptors (people/property) impacted by displaced flood water.

8.4.25 There is also a risk of increased flooding due to the construction of haul roads, access points and lifting platforms. In such locations the alteration of the ground surface could increase runoff rates and consequently flood risk. In such locations mitigation measures would include temporary attenuation of runoff prior to discharge at controlled rates to receiving watercourses.

For areas where there is the greatest risk of flooding, a flood risk assessment will be prepared

8.4.26 Consequently, it is proposed that areas where the Project crosses a Main River or ordinary watercourse floodplain (i.e. Flood Zone 2 or 3, area of surface water flood risk with an annual chance of flooding of 3.3% (1 in 30) to 0.1% (1 in 1000)), where surface water flooding is greater than 300mm deep or within the extent of potential reservoir flooding or within an area with potential for groundwater flooding to below ground structures or at the ground surface, a flood risk assessment will be prepared. The flood risk assessment will be used to subject the Project to assessment of its potential to impact on flood risk and the mitigation measures necessary to address any increase in risk.

8.4.27 Areas of the Order Limits proposed as scoped in or out from the assessment of effects during construction are illustrated in Figure 8.11. These areas are based on all the information available to the Project at the time of submission. Further data are awaited from regulators relating to the extent of Flood Zone 3B and depths of flooding associated with the risk from reservoirs. As these new data become available, the areas proposed to be scoped into and out of the EIA will be reviewed and may be subject to change. Appendix 5.2 provides raw data illustrating flood risk sources along the length of the Order Limits as supporting input data.

Operation

8.4.28 It is considered that the operational phase of the vast majority of the Project does not present the potential for significant effects on surface waters due to the pipeline being located below ground and the minimal areas of hardstanding introduced at the new pigging station. As such, this effect is scoped out of the assessment based on Planning Inspectorate Advice Note 7 question 1.

For the operational phase, the Project does not present the potential for significant effects on surface waters and is scoped out except at pigging stations.

8.4.29 However, the management of waste at pigging stations has the potential to impact on local receptors. Draining down fuel from the isolated pipeline at pigging stations and waste emerging from the pipeline during pigging operations will require effective management.

8.4.30 Mitigation measures include the design of systems to contain fuel and wastes drained from the pipeline during inspections (prior to removal from site for treatment and disposal) and systems to treat runoff from hard standings prior to discharge to the environment.

8.4.31 The assessment of the operational effects of the pigging stations on water quality is scoped in to the Environmental Impact Assessment.

Fluvial Geomorphology

8.4.32 Effects of the operation of the Project on fluvial geomorphology could include:

- Reduction of lateral connectivity locally by crossing structures and pipeline infrastructure removing riparian vegetation.
- Disruption of natural forms and processes whilst carrying out routine or emergency maintenance on the pipeline.

8.4.33 It is not anticipated that the potential effects during operation of the Project would lead to any significant effects on the fluvial geomorphology receptors. It has been determined that for all fluvial geomorphology receptors it is unlikely that there would be any significant effects as a result of the operation of the Project and these are scoped out (on the basis of Planning Inspectorate Advice Note 7 questions 2, 5 and 6).

For operation, the most sensitive water courses are scoped in for assessing geomorphological impacts, with low sensitive receptors scoped out.

Flood Risk

8.4.34 It is considered that following completion of construction and the restoration of ground levels, the operational phase of the Project would not exacerbate flood risk from fluvial, surface water sources or reservoirs.

8.4.35 The new pigging station has the potential to increase areas of hardstanding locally, however any impact of this is considered to be limited and can be mitigated through incorporation of SuDS if required.

For operation, the Project would not exacerbate flood risk and is scoped out.

8.4.36 It is proposed that due to the lack of pathways (i.e. means for the pipeline to impact on flood risk) during operation, flood risk during the operational phase of the Project will be scoped out of the assessment based on Planning Inspectorate Advice Note 7 questions 1, 5 and 6.

8.5 Impact Assessment Methodology

Consultation

8.5.1 Consultation is ongoing with the following key consultees:

- Environment Agency for provision of data, discussion of methodologies and the scope of surveys and ground investigation to support the assessment;
- Water companies (Affinity Water, Portsmouth Water, Southern Water, South East Water and Thames Water Utilities) in relation to public water supplies and discharges;
- Local Authorities in relation to flood zone mapping and private water supplies; and
- Natural England in relation to GWDTE.

8.5.2 Consultations in relation to land quality aspects which may affect groundwater are detailed in Chapter 11 Soils and Geology.

Assessment Process

8.5.3 There are no published technical guidance criteria for assessing and evaluating effects on groundwater, fluvial geomorphology or flood risk within the context of an EIA. The assessment will therefore be based on the EIA methodology outlined in Chapter 6 Impact Assessment Methodology as well as other good practice approaches. The methodology sets out a list of criteria for evaluating the environmental effects, as follows:

- the importance (value) of the resource under consideration on a scale of sensitivity (i.e. high, medium, low or negligible),
- the magnitude of the effect in relation to the resource that has been evaluated, quantified using the scale large, medium, small, or negligible; and
- the significance of the effect using the scale major, moderate, minor and negligible using the diagram as shown in Chapter 6 Impact Assessment Methodology. For significant effects (moderate and major), additional mitigation may be required to reduce the significance of the effect.

8.5.4 An effect may be considered to be significant if, in the professional opinion of the expert undertaking the assessment, it would meet at least one of the following criteria:

- it could lead to an exceedance of defined guidelines or widely recognised levels of acceptable change (e.g. exceedance of an EQS of a water quality parameter);
- it is likely that the consenting authority would reasonably consider applying a condition, requirement or legal agreement to the development consent to require specific additional mitigation to reduce or overcome the effect;
- it threatens or enhances the viability or integrity of a receptor or receptor group of concern; or
- it is likely to be material to the ultimate decision about whether or not the application for development consent should be approved.

8.5.5 To aid the determination of significance, the assessment of effects will take the following stepped approach:

- determine the relevant receptors;
- derive their value (importance) based on the criteria set out in tables below;
- identify and consider the effects from each activity;
- determine the magnitude of change likely as a result of the effects, as set out in the tables below; and
- present the environmentally and ecologically significant effects and then consider how additional mitigation may reduce negative effects.

8.5.6 The potential effect significance is presented as either Major, Moderate, Minor or Negligible as detailed in Chapter 6 Impact Assessment Methodology.

8.5.7 In accordance with Chapter 6 Impact Assessment Methodology, the significance of effect will be determined with the inclusion of embedded mitigation measures and good practice mitigation. Embedded mitigation is measures that are integral to the Project and are already incorporated within the current design. Good practice mitigation represents measures that are in line with legal compliance and industry good practice measures (as outlined in Chapter 4 Design Evolution).

8.5.8 Where the first stage in the assessment identifies that there are likely to be significant effects, the potential for additional mitigation measures to reduce effects will be identified.

8.5.9 Any effects identified to be significant following implementation of embedded, good practice and additional mitigation, are referred to as 'residual effects'.

Assessment Criteria

8.5.10 The value of receptors for each sub-topic (groundwater, surface water and flood risk, and fluvial geomorphology) reflect the importance of features outlined in key policy documents.

8.5.11 The magnitude of change is a measure of the scale or extent of the change in the baseline condition, irrespective of the value of the receptor(s) affected. In determining magnitude, the extent of the physical change would be considered in the context of other factors such as the likelihood of effect, existing long-term trends, the timescale over which the effect occurs and whether the effect would be temporary or permanent.

8.5.12 Tables 8.13 and 8.14 respectively, provide criteria for determining the sensitivity/value (i.e. level of importance) and magnitude of change for water related assets.

Table 8.13 Criteria for Sensitivity/Value of Receptors

Sensitivity/Value	Criteria
High	**Groundwater:** Principal aquifer. Licensed groundwater abstractions. Groundwater quality associated with Source Protection Zone (SPZ) 1 (Inner Protection Zone).

Sensitivity/Value	Criteria
	Buildings of regional or national importance, such as scheduled monuments, hospitals, power stations and industrial buildings. Water feeding highly or moderately groundwater dependent Groundwater Dependent Terrestrial Ecosystems (GWDTE) with a high environmental importance and international or national value, such as Ramsar sites, Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Sites of Special Scientific Interest (SSSIs). **Surface Water:** Water feeding highly or moderately Surface Water Dependent Ecosystem (SWDE) with a high environmental importance and international or national value, such as Ramsar sites, Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Sites of Special Scientific Interest (SSSIs). Supports licensed large scale abstraction for potable supply. WFD water body status of Good. **Fluvial Geomorphology:** A watercourse that appears to be in complete natural equilibrium and exhibits a natural range of morphological features (such as pools and riffles). There is a diverse range of fluvial processes present, free from any modification or anthropogenic influence. **Flood Risk:** Development area lies within Flood Zone 3B (≥5% AEP) or Flood Zone 3A (≥1% AEP) in a residential /developed area or within or crosses a flood defence/Flood Storage Area. Development area lies within the 3.3% AEP surface water flood extent where the associated depth is greater than 300mm and/or is traversed by an overland flood flow route. Within an area of reservoir inundation with a maximum depth of >2m or, lies within 8m of the toe of a reservoir embankment. Areas Susceptible to Groundwater Flooding defines the development area to have a potential for groundwater flooding to occur at the surface.
Medium	**Groundwater:** Secondary A aquifer. Extensive non-licensed private water abstractions (i.e. feeding ten or more properties or supplying large farming / animal estates). Groundwater quality associated with SPZ2 (Outer Protection Zone). Residential and commercial properties. Water feeding low groundwater dependent GWDTE sites with a high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs; or water feeding highly or moderately groundwater dependent GWDTE with a national non-statutory UK Biodiversity Action Plan (BAP) priority. **Surface Water:** Water feeding low SWDE sites with a high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs; or water feeding highly or moderately SWDE with a national non-statutory UK Biodiversity Action Plan (BAP) priority. Supports licensed small scale substitutable abstraction for potable supply or extensive non-licensed private water abstractions (i.e. feeding ten or more properties or

Sensitivity/Value	Criteria
	supplying large farming / animal estates). WFD water body status of Moderate with Good chemical quality. **Fluvial Geomorphology:** A watercourse that appears to be in natural equilibrium and exhibits a natural range of morphological features (such as pools and riffles). There is a diverse range of fluvial processes present, with very limited signs of modification or other anthropogenic influences. **Flood Risk:** Development area lies within Flood Zone 3A (≥1% AEP) in a rural area. Development area lies within the 3.3% to 1% AEP surface water flood extent where the associated depth is greater than 300mm. Development area within an area of reservoir inundation with a depth of flooding between 2m and 0.3m. Areas Susceptible to Groundwater Flooding defines the development area to have a potential for groundwater flooding of property situated below ground level.
Low	**Groundwater:** Secondary B or Secondary Undifferentiated aquifer. Small scale private water abstractions (i.e. feeding fewer than ten properties). Groundwater quality associated with SPZ3 (Source Catchment Protection Zone). Vacant residential properties and buildings. Water feeding low groundwater dependent GWDTE with a national non-statutory UK BAP priority; or water feeding highly or moderately groundwater dependent GWDTE sites with no conservation designation. **Surface Water:** Water feeding low SWDE with a national non-statutory UK BAP priority; or water feeding highly or moderately SWDE sites with no conservation designation. Supports limited non-licensed abstraction for non-potable supply. WFD water body status of Poor with Good chemical quality. **Fluvial Geomorphology:** A watercourse showing signs of modification, recovering to a natural equilibrium, and exhibiting a limited range of morphological features (such as pools and riffles). The watercourse is one with a limited range of fluvial processes and is affected by modification or other anthropogenic influences. **Flood Risk:** Development area lies within Flood Zone 2 (≥1% to 0.1% AEP). Development area lies within 1% to 0.1% AEP surface water flood extent or the 3.3% AEP extent where the depth is less than 300mm. Development area within an area of reservoir inundation with a depth of flooding <0.3m. Areas Susceptible to Groundwater Flooding defines the development area to have a limited potential for groundwater flooding.
Negligible	**Groundwater:** Very poor groundwater quality and/or very low permeability make exploitation of groundwater unfeasible. No active groundwater supply.

Sensitivity/Value	Criteria
	Industrial buildings that are currently not utilised, all derelict buildings and infrastructure that serves a single dwelling. Groundwater that supports a wetland not classified as a GWDTE, although may receive some minor contribution from groundwater. **Surface Water:** Surface water that supports a wetland not classified as a SWDE, although may receive some minor contribution from surface water. No surface water abstractions. WFD water body status of Poor and failing to achieve chemical quality. **Fluvial Geomorphology:** A highly modified watercourse that has been changed by channel modification or other anthropogenic pressures. The watercourse exhibits no morphological diversity and has a uniform channel, showing no evidence of active fluvial processes and not likely to be affected by modification. Highly likely to be affected by anthropogenic factors. Heavily engineered or artificially modified and could dry up during summer months. **Flood Risk:** Development area lies within Flood Zone 1 (<0.1% AEP). Development area outwith 0.1% AEP surface water flood extent. Development area outwith area of reservoir inundation. Development area located on an Aquitard / not assessed by Areas Susceptible to Groundwater Flooding.

Table 8.14 Criteria for Magnitude of Change to Groundwater Receptors

Magnitude	Description	
	Adverse	**Beneficial**
Large	**Groundwater:** Major or irreversible change to groundwater aquifer(s) flow, water level, quality or available yield which endangers the resources currently available. Groundwater resource use / abstraction is irreparably impacted upon, with a major or total loss of an existing supply or supplies. Changes to water table level or quality would result in a major or total change in, or loss of, a groundwater dependent area, where the value of a site would be severely affected. Changes to groundwater aquifer(s) flow, water level and quality would result in major changes to groundwater baseflow contributions to surface water and/ or alterations in surface water quality, resulting in a major shift away from baseline conditions such as change to WFD status. Dewatering effects create significant differential settlement effects on existing infrastructure and buildings leading to extensive repairs required.	**Groundwater:** Major increase in groundwater resource availability. Results in the achievement of Good Status for a WFD groundwater body or GWDTE which is currently failing its WFD objectives. Removal of existing or potential polluting discharge to groundwater.
	Surface Water: Reduces resource availability resulting in change to assessment point status. Reduction in major potable abstraction (quantity or quality). Derogates existing water quality or impacts on ability of water body to achieve WFD objective.	**Surface Water:** Increases resource availability resulting in change to assessment point status. Accelerates achievement of Good Status. Removes existing polluting discharge, or removes the likelihood of polluting discharges occurring to a watercourse.
	Fluvial Geomorphology: Loss or extensive damage to habitat due to extensive modification. Replacement of a large extent of the natural bed and/or banks with artificial material. Extensive change to channel planform.	**Fluvial Geomorphology:** Removal of an existing superfluous structure or artificial channel bed/bank. Removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring to a watercourse.

Magnitude	Description	
	Adverse	**Beneficial**
	Flood Risk: Increase in flood risk to sensitive receptors (people, business or arterial infrastructure).	**Flood Risk:** Reduction of flood risk to sensitive receptors (people, businesses or arterial infrastructure).
Medium	**Groundwater:** Moderate long term or temporary significant changes to groundwater aquifer(s) flow, water level, quality or available yield which results in moderate long term or temporarily significant decrease in resource availability. Groundwater resource use / abstraction is impacted slightly, but existing supplies remain sustainable. Changes to water table level or groundwater quality would result in partial change in or loss of a groundwater dependent area, where the value of the site would be affected, but not to a major degree. Changes to groundwater aquifer(s) flow, water level and quality would result in moderate changes to groundwater baseflow contributions to surface water and/ or alterations in surface water quality, resulting in a moderate shift from baseline conditions upon which the WFD status rests. Dewatering effects create moderate differential settlement effects on existing infrastructure and buildings leading to consideration of undertaking minor repairs.	**Groundwater:** Moderate increase in groundwater resource availability. Contributes, in combination with other effects, to the achievement of Good Status for a WFD groundwater body or GWDTE which is currently failing its WFD objectives. Significant reduction of existing or potential polluting discharge to groundwater.
	Surface Water: Impacts on WFD measure(s) ability to deliver benefits but not on achievement of objectives. Reduces local small scale resource availability but no discernible change to assessment point status.	**Surface Water:** Contributes towards achievement of WFD water body objectives. Increase in resource availability but no discernible change to assessment point status.
	Fluvial Geomorphology: Partial loss or damage to habitat due to modifications. Replacement of the natural bed and/or banks with artificial material (total length is more than 3% of water body length).	**Fluvial Geomorphology:** Partial creation of both in-channel and riparian habitat. Removal of an existing superfluous structure or artificial channel bed/bank.

Magnitude	Description	
	Adverse	**Beneficial**
	Flood Risk: Increase in flood risk to non-sensitive receptors (i.e. non-arterial infrastructure).	**Flood Risk:** Reduction of flood risk to non-sensitive receptors (i.e. non-arterial infrastructure).
Small	**Groundwater:** Minor changes to groundwater aquifer(s) flow, water level, quality or available yield leading to a noticeable change, confined largely to the Project area. Changes to water table level, groundwater quality and yield result in little discernible change to existing resource use. Changes to water table level or groundwater quality would result in minor change to groundwater dependent areas, but where the value of the site would not be affected. Changes to groundwater aquifer(s) flow, water level and quality would result in minor changes to groundwater baseflow contributions to surface water and / or alterations in surface water quality, resulting in a minor shift from baseline conditions (equivalent to minor but measurable change within WFD status). Dewatering effects create minor differential settlement effects on existing infrastructure and buildings which may need to be monitored but where repairs may be avoidable.	**Groundwater:** Minor increase in groundwater resource availability. Leads to improvement of a WFD groundwater body which is currently failing its WFD objectives but insufficient effect to achieve Good Status. Minor reduction of existing or potential polluting discharge to groundwater.
	Surface Water: Impacts on WFD measure(s) but not on its successful delivery within assessment period. Localised small scale reduction in resource availability.	**Surface Water:** Contributes towards WFD measure(s). Localised small scale increase in resource availability.
	Fluvial Geomorphology: Slight change/deviation from baseline conditions or partial loss or damage to habitat due to modifications.	**Fluvial Geomorphology:** Slight change/deviation from baseline conditions or partial improvement or gain in riparian or in-channel habitat.
	Flood Risk: Increase in flood risk to agricultural land (arable fields, pasture/grazing)	**Flood Risk:** Reduction of flood risk to agricultural land (arable fields, pasture/grazing)

Magnitude	Description	
	Adverse	Beneficial
Negligible	**Groundwater:** Very slight change from groundwater baseline conditions, approximating to 'no change' conditions. Dewatering effects create no or no noticeable differential settlement effects on existing infrastructure and buildings. **Surface Water:** No impact on WFD measures and/or their ability to achieve WFD water body objectives. No change in resource availability. **Fluvial Geomorphology:** Very slight change from surface water baseline conditions, approximating to a 'no change' situation. **Flood Risk:** No discernible change in flood risk.	

8.6 Summary Scope for the EIA

8.6.1 Table 8.15 provides a summary of issues proposed to be scoped in and scoped out of the assessment.

Table 8.15 Matters of significance for the water environment

Receptor	Matter / potential effect	Locations	Comments
Groundwater			
Changes to groundwater recharge rates	During construction	All locations	Scoped out
Interception of shallow groundwater	During construction	All locations except for those indicated below	Scoped out
		In the vicinity of all GWDTE with national or international designations or GWDTEs with local designations that have high or moderate groundwater dependency. In the vicinity of shallow groundwater private water supplies. Where the pipeline runs parallel to watercourses which may be fed by shallow groundwater.	Scoped in
Interception of shallow groundwater in the pipeline trench which could lead to groundwater of poor quality discharging to sensitive receptors	During construction	All locations except in GWSA-D	Scoped out
		Within GWSA-D	Scoped in
Connection of two aquifer units at trenchless crossings	During construction and operation	All trenchless crossings	Scoped in
Changes to groundwater quality from migration of dissolved substances (excludes historical contaminated land or landfills which is considered in Chapter 11 Soils and Geology)	During construction	All locations	Scoped out
Changes to groundwater quality from migration of suspended solids	During construction	All locations except for the unconfined Chalk Principal aquifer	Scoped out

Receptor	Matter / potential effect	Locations	Comments
		Chalk unconfined Principal aquifer. Where the Chalk is confined, this is scoped out due to the depth of the Chalk aquifer.	Scoped in
Changes to groundwater levels and groundwater flow direction caused by temporary groundwater dewatering activities	During construction	GWDTE in the vicinity of dewatering activities. Watercourses in the vicinity of dewatering activities. Groundwater abstractions in the vicinity of dewatering activities. Buildings in the vicinity of dewatering activities. The distance from dewatering activities for which features will be considered in the assessment will be determined on a case-by-case basis based on professional judgement.	Scoped in
Discharge of dewatering water to ground affecting groundwater quality	During construction	All locations where discharge to ground would occur	Scoped in
Change in groundwater levels and flow direction due to discharge of dewatering water to ground	During construction	All locations where discharge to ground would occur	Scoped in
Changes to groundwater quality from leaks and spills from chemicals, fuels and oils used in construction	During construction	All locations except where trenches cross GWDTE	Scoped out
		Where trenches cross GWDTE	Scoped in
Changes to groundwater flow direction or level due to below ground structures	During operation	All locations except for GWDTE	Scoped out
		In the vicinity of GWDTE	Scoped in

Receptor	Matter / potential effect	Locations	Comments
Leaks of aviation fuel	During operation	Principal aquifers Secondary A aquifers SPZs	Scoped in. Where the Chalk is confined, this is scoped out due to the depth of the Chalk.
		Secondary Undifferentiated aquifers and Unproductive Strata. The confined Chalk in GWSA-C and GWSA-D.	Scoped out
Fluvial Geomorphology			
Changes to morphological processes and features as a result of open cut crossings	Construction activities	Negligible and Low sensitivity fluvial geomorphology receptors	Scoped out
	Construction activities	Medium and High sensitivity fluvial geomorphology receptors	Scoped in
Changes to morphological processes and features as a result of haul road crossings and culverts in the channel. Removal of riparian vegetation corridor and disturbance of channel banks	Construction activities	All fluvial geomorphology receptors	Scoped in
Changes to morphological processes and features as a result of directionally drilled crossings	Construction activities	All fluvial geomorphology receptors	Scoped out
	Operational effects	All directionally drilled watercourses and Negligible and Low sensitivity fluvial geomorphology receptors	Scoped out

Receptor	Matter / potential effect	Locations	Comments
Changes to morphological processes and features as a result of operation of pipeline	Operational effects	Medium and High sensitivity fluvial geomorphology receptors and fluvial geomorphology receptors crossed by permanent access tracks	Scoped out
Water Framework Directive			
Potential effects on WFD quality elements leading to changes in WFD status/potential or achievement of WFD objectives	Construction effects - crossings and haul roads	14 surface WFD water bodies 10 groundwater WFD water bodies	Scoped in
	Operational effects - potential channel change following open cut crossings		
Surface Water			
Potential for impact on surface water quality and resource availability due to suspended sediments and/or fuel/chemical spillage	Construction effects	All locations	Scoped in
Potential for impact on surface water quality and resource availability due to fuel leakage or spillage from pigging station	Operational effects	Pigging stations	Scoped in
Flood Risk			
Changes to Flood Risk	During construction	Order Limits running through very low and low value receptors	Scoped out
		Order Limits through medium and high value receptors	Scoped in

Receptor	Matter / potential effect	Locations	Comments
Changes to flood risk	During operation	Order Limits	Scoped out
Potential impact of runoff from Pigging Stations to impact on local flood risk.	During construction	Where flood risk receptors assessed to be of high or medium value	Scoped in
Potential impact of runoff from Pigging Stations to impact on local flood risk.	During Operation	Flood risk receptors assessed to be of high or medium value	Scoped in

Chapter 9
Historic Environment

Scoping Report Volume 1

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9. Historic Environment

9.1 Introduction

9.1.1 The historic environment covers all receptors associated with the interaction between people and places through time. This includes all surviving physical remains of past human activity and the changes that humans have had on the environment. This development has the potential to have a physical effect on heritage assets (receptors) through their damage during construction, operation and decommissioning. It also has the ability to change how heritage assets are perceived.

9.1.2 All heritage assets including buried remains have a setting, which is defined as the surroundings in which a heritage asset is experienced. The extent of the setting of a heritage asset is not fixed and may change as the asset and its surroundings evolve (MHCLG, 2012). The value of a heritage asset can be affected by impacts on the setting.

9.1.3 For the purposes of this assessment, the historic environment comprises three groups of receptors defined as:

- Archaeological remains: the material remains of human activity from the earliest periods of human evolution to the present. These may be buried traces of human activities, sites visible above ground, or moveable artefacts.
- Historic buildings: architectural, designed or other structures with a significant historical value. These may include structures that have no aesthetic appeal or structures not usually thought of as buildings, such as milestones or bridges.
- Historic landscapes: the current landscape, whose character is the result of the action and interaction of natural and / or human factors.

9.1.4 The cultural heritage baseline is outlined and the likely effects are identified within this chapter. The scope of the cultural heritage assessment for the EIA and the technical methodology are also described here.

9.1.5 The Design Manual for Roads and Bridges, DMRB HA 208/07 Cultural Heritage (Highways Agency 2007) sets out a methodology for assessing value of heritage assets and the significance of effects of a proposed development. This methodology was developed with Historic England and has been successfully used on linear pipeline projects, to assess value of heritage assets and the significance of effect. This methodology will inform the assessment of effect and the scoping in or out of historic environment receptor groups.

9.1.6 This chapter is based on desk top studies and consultation with the historic environment advisors to Hampshire and Surrey County Councils and Winchester City Council.

9.1.7 This chapter has been prepared by a technical expert in the field of cultural heritage employed by Jacobs. He has over 25 years of experience in the sector, including nearly twenty years in District, Borough and County Council Heritage Services before joining Jacobs. His qualifications include a BA (Hons) in Archaeology and he has been a member of the Chartered Institute for Archaeology since 1990.

9.2 Legal Requirements

9.2.1 The assessment has been carried out in accordance with relevant legislation and planning policy.

Legislation

9.2.2 The relevant legislation includes:

- Ancient Monuments and Archaeological Areas Act 1979 (AMAA), (amended by the National Heritage Act 1983 and 2002): Scheduled Monuments are protected by law and are, by definition, of national importance;
- Planning (Listed Buildings and Conservation Areas) Act 1990 (amended by the Enterprise and Regulatory Reform Act 2013);
- The Hedgerows Regulations 1997 (amended 2003): The Regulations protect hedgerows over 20m in length and older than 30 years which are considered to be historically, ecologically or visually important.

Policy

Overarching National Policy Statement for Energy (EN-1)

9.2.3 The Overarching National Policy Statement for Energy (EN-1) (DECC 2011) states that "the construction, operation and decommissioning of energy infrastructure has the potential to result in adverse impacts on the historic environment" (EN-1, 5.8.1). The statement sets out guidance for the consideration of designated and non-designated assets (EN-1, 5.86).

9.2.4 EN-1 states that the level of detail in the assessment should be proportionate to the asset's importance. It should be no more than is sufficient to understand the potential impact of the proposal on the assets. As a minimum the relevant Historic Environment Records should be consulted and the heritage assets assessed using appropriate expertise (EN-1, 5.88).

National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)

9.2.5 The National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (DECC 2011) does not state anything regarding the historic environment for on-shore pipelines above those requirements identified in EN-1.

9.2.6 Whilst EN-1 and EN-4 remain the prime decision making documents, where they do not provide guidance, the following may also be considered important and relevant guidance that may require consideration by the decision making authority. At this stage it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State and it is included for completeness to allow the Secretary of State to make such a determination.

National Planning Policy Framework

9.2.7 National planning policies for the conservation of the historic environment are set out in Section 12 of National Planning Policy Framework (NPPF) (MHCLG, 2012). Their objective is to maintain and manage change to heritage assets in a way that sustains and where appropriate enhances its significance or value. In the absence of guidance within EN-4, the NPPF is referred to for guidance.

9.2.8 The NPPF states that to make sound decisions a determining authority needs to understand the significance or value of any heritage asset affected (NPPF, paragraph 128). This may require some investigative work but this must be in proportion to the asset's importance and the potential impact.

9.2.9 Designated assets (World Heritage Sites, Scheduled Monuments, Listed Buildings, Registered Battlefields, Registered Parks and Gardens and Conservation Areas) are subject to specific policies (NPPF, paragraphs 132 and 139). These policies state that where development would lead to substantial harm or total loss of significance, consent should be refused. This is unless it can be demonstrated that it is necessary to achieve substantial public benefits that outweigh the harm or loss, or that certain requirements are met.

Local Planning Policy

9.2.10 There are a large number of local planning policies relevant to the historic environment, and these would be considered within the ES. The key theme common throughout the Local Plans is to protect and enhance Heritage Assets. Some local planning authorities, such as Rushmoor, identify particular design and heritage issues while others, such as Surrey Heath, have identified Areas of High Archaeological Potential. Appendix 2 identifies Local Plans relevant to the local authority areas affected by the Project.

9.3 Baseline Conditions

Study Area

9.3.1 A study area extending 300m from the Order Limits in all directions has been used for data collection for all historic environment receptors. This is sufficient to capture any features likely to be directly affected by the Project and takes into account any future minor design/route changes. The size of study area is informed by guidance on scoping given within DMRB and with accepted good practice (as outlined within Chapter 4).

9.3.2 In addition, designated assets within 1km of the Order Limits have been included in the baseline to establish the presence of any potential impacts on their setting. As a Zone of Theoretical Visibility (ZTV) for the Project has not yet been defined at the time of writing (please refer to Chapter 10 for definition) the size of the study area is informed by accepted good practice.

9.3.3 Designated and non-designated assets and the study areas are shown on Figure 9.1. All heritage assets referred to are listed in Appendix 6.

Data Sources

9.3.4 The following sources of data were used during the scoping stage to establish the cultural heritage baseline:

- National Heritage List for information on nationally designated heritage assets including, World Heritage Sites, Listed Buildings, Registered Battlefields, Registered Parks and Gardens and Scheduled Monuments (Historic England, 2018);
- Hampshire Historic Environment Record (HHER) for information on known archaeological assets, locally listed buildings in Hampshire and data from the Hampshire Historic Landscape Characterisation Project (Hampshire County Council, 2018);
- Winchester City Council Historic Environment Record (WCCHER) for information on known archaeological assets and locally listed buildings in Winchester (Winchester City Council, 2018);
- Surrey County Council Historic Environment Record (SHER) for information on known archaeological assets, locally listed buildings in Surrey and data from the Surrey Historic Landscape Characterisation Project (Surrey County Council, 2018);
- Greater London Historic Environment (GLHER) for information on known archaeological assets and locally listed buildings in the London Borough of Hounslow (Historic England, 2018);
- Hampshire County Council Integrated Character Assessment (accessed on 19/04/2018 for additional background on historic landscapes https://www.hants.gov.uk/landplanningandenvironment/environment/landscape/integratedcharacterassessment/characterareas);
- Surrey Landscape Character Assessment (accessed on 20/04/2018) for additional background on historic landscapes https://www.surreycc.gov.uk/environment-housing-and-

planning/countryside/countryside-strategies-action-plans-and-guidance/landscape-character-assessment);

- District and Borough Councils for information on Conservation Areas, locally listed buildings and locally designated archaeological areas.

Defining Value of the Assets

9.3.5 The NPPF defines the 'significance' of heritage assets as '*the value of a heritage asset to this and future generations because of its heritage interest. This may be archaeological, architectural, artistic or historic. The value may derive from the setting of the heritage asset as well as its physical presence'* (DCLG, 2012).

9.3.6 The term value has been used in this assessment to avoid confusion with the terminology for the environmental impact assessment, in particular, 'significant effects' as commonly used in EIA.

9.3.7 The assessment of value of designated and undesignated assets has been made on a scale of High, Medium and Negligible. This is based on professional judgement informed by the guidance provided in Conservation Principles (English Heritage 2008), the National Planning Policy Framework (MHCLG, 2012), The Setting of Heritage Assets (Historic England, 2017) and DMRB HA 208/07 Cultural Heritage (Highways Agency 2007). The criteria for the assessment of value are set out in Table 9.4.

9.3.8 The baseline comprises 1181 heritage assets within 1km of the Order Limits of which 586 are designated. This is set out in Table 9.1.

Table 9.1 Summary of heritage baseline

Receptor	Designated	Non-designated	Total
Archaeological remains	21	454	475
Historic buildings (including Conservation Areas)	562	70	632
Historic landscapes (including Registered Parks and Gardens)	3	71	74

Heritage Assets between 300m and 1km from the Order Limits

9.3.9 There are 448 designated heritage assets between 300m and 1km of the Order Limits, comprising 31 High value heritage assets, 417 Medium value heritage assets, and no Low or Negligible value heritage assets. These comprise Scheduled Monuments, listed buildings, Conservation Areas and a Registered Park and Garden. These are considered in order to establish any potential impact on the setting which may have an effect on their value. (Heritage assets within 300m are discussed further from paragraph 9.3.12 below).

Table 9.2 Designated assets between 300m and 1km

Receptor	Total designated assets
Archaeological remains	12
Historic buildings (inc. Conservation Areas)	435
Historic landscapes (inc. Registered Parks and Gardens)	1

Archaeological Remains

9.3.10 There are 12 Scheduled Monuments in the 300m to 1km band assessed as High value, as listed below.

- Preshaw Wood Scheduled Monument (Asset 1109) – an earthwork enclosure of uncertain date on a hilltop, partially obscured by vegetation.
- Cuckoo's Corner Roman Settlement Scheduled Monument (Asset 337) – a small unplanned Roman town with the remains of stone and timber buildings.
- Cuckoo's Corner Roman Site Scheduled Monument (Asset 329) – evidence of Roman occupation suggestive of a nearby villa.
- Earthwork at Penley Scheduled Monument (Asset 461) – an irregular enclosure of uncertain date.
- Earthworks at Barley Pound Scheduled Monument (Asset 546) – a Medieval ringwork and motte.
- Powderham Castle Scheduled Monument (Asset 577) – a circular earthwork from a small Norman Castle.
- Earthworks at Childown Farm Scheduled Monument (Asset 895) – an earthwork enclosure with three banks and two ditches.
- Bowl Barrow at Barrowhills Scheduled Monument (Asset 882) – one of an original group of three, partially excavated in the 1930s when a Bronze Age spearhead was found.
- Chertsey Abbey Scheduled Monument (Asset 962) – the ruins and earthworks of the abbey survive.
- Anglo Saxon and Medieval cemetery Scheduled Monument (Asset 1093) – was excavated in the grounds of Saxon Primary School.
- Roman Site west of East Bedfont Church Scheduled Monument (Asset 1106).
- Causewayed enclosure north east of Mayfield Farm Scheduled Monument (Asset 1107).

Historic Buildings

9.3.11 Also within the 300m to 1km band are also four Grade I listed buildings and 15 Grade II* listed buildings, which have been assessed as High value and 407 Grade II listed buildings and nine Conservation Areas which have been assessed as Medium value (see paragraph 9.3.8 for value definitions):

- Four Grade I listed buildings: Jane Austen's House (Asset 261), Church of All Saints, Crondall (Asset 516), Church of All Saints, Laleham (Asset 998) and the Church of St Mary Magdalene (Asset 1098).
- 15 Grade II* listed buildings: Durley Mill House (Asset 61), Church of St Mary Magdalene (Asset 188), Church of St Nicholas (Asset 254), The Manor House (Asset 258), Chawton House (Asset 266), Cruck Cottage (Asset 280), Manor House Farmhouse (Asset 281), Church of All Saints (Asset 289), Bonham's Farmhouse (Asset 342), Silvester's Farmhouse (Asset 441), Hussey's (Asset 449), Church of St Mary (Asset 483), Brook Place (Asset 822), Pyrcroft Place (Asset 936) and Soames Place (Asset 193).
- 407 Grade II listed buildings.
- Nine Conservation Areas: Botley, Upham, Preshaw, Farringdon, Chawton, Isington, Bentley, Farnborough Church and Chertsey.

Historic Landscapes

9.3.12 There is one designated historic landscape within the 300m to 1km band:

- Frimley Park (Asset 698) was developed around a house built in the early to mid-eighteenth century incorporating an earlier building. By 1842 formal gardens were laid out, there were c 20ha of pleasure grounds and plantations, a triangular lake and a network of approach drives. From the 1860's onwards land parcels were sold and the estate reduced in size. A formal rose garden and sunken garden were set out in the 1920's. The reduced estate was sold to the War Office in 1947, and was the Womens Royal Army Corps Staff College until 1959 when it became a Cadet Training Centre. (Section D, see Figure 9.11 Sheet 9).

Heritage Assets within the 300m study area

9.3.13 There are 739 heritage assets within 300m of the Order Limits, comprising 19 High value heritage assets, 182 Medium value heritage assets, 387 Low value heritage assets and 153 Negligible value heritage assets. There are no World Heritage Sites or other internationally important heritage assets within the 300m study area. This is set out in Table 9.3.

9.3.14 Archaeological remains form the largest historic environment receptor group within the 300m study area, with 463 heritage assets. These range from High value Scheduled Monuments to chance finds recovered during metal detecting. The known archaeological remains range in date from the evidence of early prehistoric occupation to twentieth century defences.

9.3.15 Historic Buildings form the second largest receptor group with 204 heritage assets, which includes nine Conservation Areas.

9.3.16 Historic Landscapes form the smallest receptor group with 71 historic landscape types and two Registered Parks and Gardens.

Table 9.3 Summary of baseline within the 300m study area

Receptor	Designated	Non-designated	Total
Archaeological Remains	9	454	463
Historic Buildings (including. Conservation Areas)	134	70	204
Historic Landscapes (including. Registered Parks and Gardens)	2	71	73

Archaeological Remains

9.3.17 There are 463 archaeological remains which lie within the 300m study area. These include the following nine Scheduled Monuments, comprising Roman and Medieval settlements, an eighteenth century bridge and a number of Prehistoric earthwork monuments, which have been assessed as High value:

- Lomer Deserted Medieval Village (Asset 123) – mentioned in the Domesday Book and comprised of earthworks representing croft enclosures separated by sunken paths and former roads (Section A of the route, see Figure 9.1 Sheet 2).
- Bramdean Roman Villa (Asset 1108) – the site of a Roman villa occupies by farm buildings incorporating Roman remains. Seven rooms and corridor uncovered, including two intact mosaic floors (Section A, see Figure 9.1 Sheet 3).
- Four bowl barrows on West End Common (Asset 792) – four neighbouring bowl barrows aligned east-west along the crest of a hill. All mounds have slight central depression suggesting previous excavation. Mounds survive with trace ditches (Section D, see Figure 9.1 Sheet 10).
- Bowl barrow at New England, West End Common (Asset 793) – bowl barrow situated on low sandstone ridge overlooking lower lying heathland. North side of ditch disturbed by modern cycle route. Mound survives (Section D).
- Bee Garden earthwork at Albury Bottom (Asset 858) – banked trapezoidal enclosure c.100m across. Prehistoric date likely, re-use in medieval possible (Section E, see Figure 9.1 Sheet 11).
- Bowl barrow at Pipers Green Stud (Asset 885) – bowl barrow situated on rise in Bagshot sands. Surrounded by well-preserved ditch and some remains of outer bank (Section E).
- Bowl barrow at Flutters Hill (Asset 891) – situated on gentle west facing slope in undulating area of sands and gravels. Slight remains of surrounding bank and ditch (Section E).
- Chertsey Bridge (Asset 1036) – late eighteenth century multi-span stone bridge over River Thames, east of Chertsey. Built upstream from earlier bridge which it replaced. Alterations and restoration in the nineteenth and twentieth centuries (Section E, see Figure 9.1 Sheet 12).
- Roman camp at Matthew Arnold School (Asset 1019) – situated within the school's playing fields, survives as a slight earthwork (Section F, see Figure 9.1 Sheet 13).

9.3.18 There are a further 454 non-designated archaeological remains included within the relevant Historic Environment Records. Further desk based assessment and survey as set out in Appendix 3 - Survey Methodology Report and Section 9.5 below, will be carried out to confirm their value. Further details are available in Appendix 6 of the following:

- Archaeological remains assessed as Medium value include a range of prehistoric funerary monuments and enclosures identified as cropmarks and earthworks. Also Prehistoric, Roman and Medieval settlement sites and rarer examples of twentieth century defences. Those areas identified by the local authorities as having a high archaeological potential have also been assessed as Medium value.
- Archaeological remains assessed as Low value include cropmarks with no currently discernible form. Also included are chance finds recovered through systematic survey which may indicate the presence of archaeological sites. Archaeological sites that have been partially destroyed are also assessed as Low value.
- Archaeological remains assessed as Negligible value include comparatively modern features such as cropmarks of post-medieval quarries and nineteenth century field boundaries. This value also includes chance archaeological finds and archaeological sites that have been completely destroyed.

Historic Buildings

9.3.19 There are 204 historic buildings within the 300m study area. These include the following three Grade I listed buildings and seven Grade II* listed buildings. These have all been assessed as High value, as follows:

- The Church of St Mary of the Assumption (Asset 398), Froyle – a Grade I listed building which dates from the early fourteenth century, this parish church had a Victorian restoration and refitting. The original steeple was replaced by a tower in 1722, but the church retains some original features. The church is of earlier origin with a Norman stone barrel font (Section B, see Figure 9.1 Sheet 6).
- The Main Building to Farnborough Hill Convent (Asset 676) – a Grade I listed building which dates from 1863 and was built by H E Kendall (Junior). Originally constructed for T G Longman, the publisher, the building was bought in 1879 by the widowed Empress of Napoleon III, who extended the building in 1883. Empress Eugenie held a ‘court in exile’ there until her death in 1920. The building became a Catholic girls school in the twentieth century (Section D, see Figure 9.1 Sheet 13).
- The Abbey Church of St Michael (Asset 680) – a Grade I listed building which was built for the Empress Eugenie in 1886-87 as a memorial to her husband Napoleon III, with the crypt serving as a mausoleum for their remains. The building was constructed in the Late French Gothic style (Section D).
- Riversdown (Asset 125) – a Grade II* listed building which is a fourteenth century timber framed hall with seventeenth century additions and early nineteenth century cladding (Section A, see Figure 9.1 Sheet 3).

- Woodcote Manor (Asset 143) – a Grade II* listed building which is a small country house with origins in the fifteenth century, altered in the seventeenth century and restored in 1911 (Section A, see Figure 9.1 Sheet 3).
- Froyle Place (Asset 391) – a Grade II* listed building which was built in the late sixteenth and early seventeenth centuries, the original manor was granted by Edward the Confessor to the Abbey of St Mary in Winchester for the use of the Abbess (Section B).
- Manor House (Asset 369) – a Grade II* listed building which is a fine red brick Queen Anne house with extensions and changes in the early twentieth century (Section B).
- Coldrey (Asset 458) – a Grade II* listed building which is a substantial timber framed structure dating from the mid seventeenth century with later extensions and cladding (Section C).
- Botleys Park Hospital (Asset 915) – a Grade II* listed building which was originally an eighteenth century mansion, described in 1771 as “one of the best houses in Surrey” (NHL, 2018) (Section E).
- Chertsey Bridge (Asset 1039) – a Grade II* listed structure built between 1783 and 1785 which is one of the least altered of James Paine’s bridges across the River Thames (see also 9.3.18 for archaeological remains) (Section E).

9.3.20 There are 115 Grade II listed buildings and nine Conservation Areas which have been assessed as Medium value, and 70 non-designated historic buildings which have been assessed as Low value. These are summarised here and further details are available in Appendix 6.

9.3.21 The Grade II Listed Buildings represent a wide range of buildings extending over a period from the late medieval period to the twentieth century. They include examples of domestic architecture, including houses and other buildings associated with larger country houses such as ice houses, stables and lodges. Advances in communication from the eighteenth and nineteenth centuries are represented by canal buildings, milestones, posts, bridges, turnpike buildings and coaching inns. There are a range of religious buildings and structures including churches, chapels, gates and monuments. Sports and leisure activities are represented through numerous public houses and even a racecourse grandstand.

9.3.22 The Conservation Areas comprise Upper Froyle, Lower Froyle, Crondall, Basingstoke Canal, St Michaels Abbey, Farnborough Hill, Chobham Village, Chertsey and Laleham (see Figure 9.1).

9.3.23 The non-designated historic buildings represent a wide range of buildings covering domestic dwellings, agricultural buildings, industrial buildings, war memorials and barracks.

Historic Landscapes

9.3.24 There are two Grade II Registered Parks and Gardens within the 300m study area, which have been assessed as Medium value:

- Chawton House (Asset 273) a house was first built on the site in 1224. In the early thirteenth century the property had c 162ha of land which included 38ha of woodland. The Manor was important in the Medieval period and the parks and

gardens were visited by Henry III and Edward I. The present house was built at the end of the sixteenth century and its gardens included formal terraces with topiary, a wilderness, two avenues and a kitchen garden. Parts of these were removed between 1763 and 1785 and new informal gardens were laid out. Further work was carried out in the late nineteenth and early twentieth centuries, including work on the terraces attributed to Edwin Lutyens. (Section B, see Figure 9.1 Sheet 5).

- Woburn Farm (Asset 1053) once formed part of the estate of Chertsey Abbey. The park and gardens date from 1735 when Philip Southcote, having married the wealthy Dowager Duchess of Cleveland, was able to buy the land. Southcote was said to have invented this idea of the *ferme ornee* where he took land at Woburn that was not particularly scenic and set out to create a working landscape that was also picturesque. Southcote had a wide circle of friends including Alexander Pope and Joseph Spence who would have visited. The registered site covers an area of c. 60ha, 37ha are occupied by the college and their grounds, 5ha as private residential development and the remainder is owned by the local authority, and little of the original park and garden survives (Section E, see Figure 9.1 Sheet 12).

9.3.25 There are 71 historic landscape types with the 300m study area. The Hampshire and Surrey Historic Landscape Characterisation Projects identified 23 broad groups, which can be further sub-divided into 71 historic landscape types. Within the 300m study area there are 291 individual land parcels which have been assigned one of these historic landscape types. These have been assessed as Low value. Further desk based assessment and survey as set out in Appendix 3 - Survey Methodology Report and Section 9.5 below, will be carried out to confirm their value. Further details are available in Appendix 6.

9.4 Likely Significant Effects

Potential Effects

9.4.1 Potential effects on heritage assets are divided into two categories:

- Physical – the loss or damage to heritage assets occurring during the construction or operation of the pipeline.
- Setting - of a heritage asset that effects the value of the asset during the construction or operation of the pipeline.

9.4.2 This section focuses on the effects of the Project's construction and operation. Decommissioning activities would be subject to an appropriate decommissioning strategy, as per Chapter 3. It is not practical to assess the effects of decommissioning at this stage, as the methodology and likely good practice mitigation measures will not be defined until closer to the time, at least 60 years from now. As such, the effects of decommissioning are scoped out of further assessment.

9.4.3 Archaeological remains, historic buildings and historic landscapes have been considered using the methodology outlined in Section 9.5. This has predicted the potential for a physical impact likely to be on a scale that may result in significant effects. This could be on known and unknown archaeological remains and on historic landscapes, but not on historic buildings. No potential impacts likely to be on a scale that may result in significant effects have been predicted on the setting of heritage assets.

Effects of construction on archaeological remains during construction are scoped in. Effects during operation would be scoped out with appropriate mitigation contained within Chapter 4. Effects during decommissioning are scoped out.

Physical Impacts

9.4.4 A likely significant effect may occur through damage to known and / or unknown heritage assets during construction. Damage can occur in the following ways:

- The removal of archaeological remains during vegetation clearance and fencing, topsoil removal, excavation and construction traffic rutting superficial archaeological remains during construction.
- The compaction of archaeological remains by construction machinery and traffic, temporary storage of spoil, machinery, equipment and materials, and temporary site buildings during construction.
- Damage to the fabric of an historic building during construction.
- The removal of a component of an historic landscape during construction.

Setting of Heritage Assets

9.4.5 Given the short and temporary nature of construction (see Chapter 3 – Description of the Development, section 3.8 for likely timescales) any impact on the setting of heritage assets is not likely to be on a scale that may result in significant effects. Impacts can occur in the following ways:

- Visual and noise intrusion during construction.

- The siting of any Above Ground Installations or Pipe Markers during operation.

Archaeological Remains

9.4.6 The route has been developed to reduce the impact on these receptors by avoiding Scheduled Monuments and where practicable, other known archaeological remains. However, the full extent of known archaeological remains is uncertain without further assessment. Also the potential for the presence of unknown archaeological remains in those areas that have not been previously disturbed.

9.4.7 Therefore, during construction there is a potential impact pathway which could lead to archaeological remains or their setting being damaged. This impact has potential to be on a scale that may result in a significant effect. Based on this, archaeological remains should be scoped in to the EIA for construction stage effects.

9.4.8 Archaeological remains are not sensitive to any impacts during operation and so would be scoped out of the EIA regarding effects during operation (Planning Inspectorate Advice Note 7 question 2).

9.4.9 Nine Scheduled Monuments within the 300m to 1km band were incorporated into the baseline to establish any potential effects on their setting. A summary of the effects on the setting of the Scheduled Monuments is presented below:

- The enclosure at Preshaw Wood (Asset 1109) is surrounded by woodland 500m to the north west of the Order Limits . The setting of the enclosure at Preshaw Wood does not make any contribution to the value of the heritage asset.
- The Roman settlement and Roman site at Cuckoos Corner (Assets 337 and 329) are buried archaeological remains with no visible earthworks to the east of the A31, the railway line and a recent housing development. They have a wide setting taking in the Roman Road network and other Roman archaeological remains in the area. However, the temporary, short term nature of the construction and the location of the Order Limits 750m to the west of the two Roman sites means the Project would have no significant impact on the setting of the heritage asset.
- The Earthwork at Penley (Asset 461) sits within an arable field 500m to the west of the Order Limits. The setting of Penley does not make any contribution to the value of the heritage asset.
- Barley Pound Earthworks (Asset 546) is described as one of the best examples of a ring and bailey castle in Hampshire. The location of Barley Pound demonstrates its strategic significance. The surrounding earthworks and enclosures contribute to the value of the asset by enabling an understanding of the siege of 1147. However, the temporary, short term nature of the construction and the location of the Order Limits 600m to the west of Barley Pound Earthworks means the Project would have no significant impact on the setting of the heritage asset.
- Powderham Castle (Asset 577) is a near circular mound and ditch of Norman date. The proximity of Powderham Castle to Barley Pound earthworks contribute to the significance of the asset, as it is often interpreted as a siege castle associated with a blockade of Barley Pound in 1147. However, the temporary, short term nature of the construction and the location of the Order Limits nearly 1km to the west of Powderham Castle means the Project would have no significant impact on the setting of the heritage asset.

- The bowl barrow west of Barrowhills (Asset 882) sits within a prominent location. It is surrounded by other barrows forming its setting as part of a Bronze Age landscape. However, the temporary, short term nature of the construction and the location of the Order Limits 800m to the south of Barrowhills means the Project would have no significant impact on the setting of the heritage asset.
- The earthworks at Childown Farm (Asset 895) form a quadrangular enclosure sitting within a low lying area of heathland on Chobham Common. This type of landscape and other non-designated archaeological remains surrounding the enclosure form its setting. However, the temporary, short term nature of the construction and the location of the Order Limits 700m to the north of the earthworks at Childown Farm means the Project would have no significant impact on the setting of the heritage asset.
- Chertsey Abbey (Asset 962) has an immediate setting consisting of the surrounding buildings and water management features which form part of the designated asset. The wider setting is formed by the water meadows at Abbey Mead and possible buildings of monastic origin at Abbey Cottages and Home Farm north and east of the Abbey towards the River Thames. However, the temporary, short term nature of the construction and the location of the Order Limits nearly 1km to the south east of Chertsey Abbey means the Project would have no significant impact on the setting of the heritage asset.
- The Anglo Saxon cemetery (Asset 1093) is west of a historic landfill site, now a lake, 750m east of the Order Limits, the setting of the Anglo Saxon cemetery does not make any contribution to the value of the heritage asset.
- The Roman Site west of East Bedfont Church (Asset 1106) is on the northern side of the existing West London Terminal storage facility. The setting of the Roman Site does not make any contribution to the value of the heritage asset.
- The Causewayed enclosure north east of Mayfield Farm (Asset 1107) is 800m north east of the Order Limits. The setting of the Causewayed enclosure does not make any contribution to the value of the heritage asset.

9.4.10 Any effect on the setting of the Scheduled Monuments would be short term and temporary (please see Chapter 3 for indicative construction schedule). Using the criteria for the assessment of impact set out in Table 9.5 this would not be on a scale that would result in significant effects on the Scheduled Monuments. Based on this, those Scheduled Monuments between 300m and 1km from the Order Limits would be scoped out of the EIA for construction stage effects (Planning Inspectorate Advice Note 7 question 3).

Any effects on settings of Scheduled Monuments would be short term and temporary. This would not result in any significant effects. Therefore, those monuments beyond 300m of the works would be scoped out.

Historic Buildings – Grade I and II* Listed Buildings

9.4.11 The route has been designed to reduce the impact on historic buildings by avoiding listed buildings (see Chapter 4). There are no Grade I or Grade II* Listed Buildings within the Order Limits.

9.4.12 Therefore, during construction there would be no potential impact pathway which could lead to historic buildings being damaged. Based on this Grade I and Grade II* Listed Buildings would be scoped out of the EIA for construction stage effects (Planning Inspectorate Advice Note 7 question 1).

9.4.13 Any impact on the setting of Grade I and Grade II* Listed Buildings would be short term and temporary. Using the criteria for the assessment of impact set out in Table 9.5. impacts would not be on a scale that would result in significant effects on Grade I and Grade II* Listed Buildings. A summary of the impact on the settings of listed buildings within 300m of the Order Limits is presented below:

- The Church of St Mary of the Assumption (Asset 398) setting is derived from its location to the north of the buildings and courtyards of the Lower School of Treloar College and Froyle Place. The main views to the church are from the north. The temporary, short term nature of the construction and the location of the Order Limits 300m to the south of the Church of St Mary of the Assumption means the Project would have no impact on the setting of the heritage asset.

The effects on settings of listed buildings, non-designated historic buildings and Conservation Areas would be short term and temporary. This would not result in significant effects. Therefore those monuments beyond 300m of the works would be scoped out.

- The setting for the Main Building to Farnborough Hill Convent's (Asset 676) consists of its own grounds and playing fields with trees to the west and south. While it is proposed to use the playing fields for the pipeline route as well as temporary storage, the short term nature of the construction means the Project would have no impact on the setting of the heritage asset.
- The Abbey Church of St Michael (Asset 680) is on higher ground, south of the railway surrounded by trees. It's setting is derived from its immediate surroundings and views from the south. The temporary, short term nature of the construction and the location of the Order Limits 180m to the north of the Abbey Church of St Michael means the Project would have no impact on the setting of the heritage asset.
- Riversdown's (Asset 125) setting is derived from the surrounding parkland. The temporary, short term nature of the construction and the location of the Order Limits 250m to the north west of Riversdown means the Project would have no impact on the setting of the heritage asset.
- Woodcote Manor (Asset 143) is surrounded by a range of Grade II listed buildings which, along with the remains of Woodcote Park help define its setting. The temporary, short term nature of the construction and the location of the Order Limits 300m to the south east of Woodcote Manor means the Project would have no impact on the setting of the heritage asset.
- Froyle Place (Asset 391) has an intimate setting closely associated with the buildings and courtyards of the Lower School of Treloar College. The temporary, short term nature of the construction and the location of the Order Limits 250m to

the south of Froyle Place means the Project would have no impact on the setting of the heritage asset.

- The Manor House (Asset 369) sits at the western end of the dispersed linear settlement of Upper Froyle. The temporary, short term nature of the construction and the location of the Order Limits 250m to the south of the Manor House means the Project would have no impact on the setting of the heritage asset.
- Coldrey's (Asset 458) is derived from the ancillary buildings, some listed, features such as the substantial pond and its relationship with the surrounding field system. The temporary, short term nature of the construction and the location of the Order Limits 300m to the north of Coldrey means the Project would have no impact on the setting of the heritage asset.
- Botleys Park Hospital's (Asset 915) setting is derived from its surrounding grounds and views from the south. The temporary, short term nature of the construction and the location of the Order Limits 300m to the north of Botleys Park Hospital means the Project would have no impact on the setting of the heritage asset.
- Chertsey Bridge's (Asset 1039) setting comes from its location and continued use as a crossing over the River Thames. The temporary, short term nature of the construction means the Project would have no impact on the setting of the heritage asset.

9.4.14 Four Grade I and 15 Grade II* Listed Buildings in the 300m to 1km band were included in the baseline to establish any potential impacts on their setting. A summary of the impact on the setting of the Listed Buildings is presented below.

- Jane Austen's House (Asset 261) is at the west end of Old Winchester Road, the village street in Chawton. The street, within the Chawton Conservation Area, is characterised by its maturity and enclosed and intimate nature. The setting is restricted to its immediate surroundings and views along the Old Winchester Road. The temporary, short term nature of the construction and the location of the Order Limits 900m to the south of Jane Austen's House would have no impact on the setting of the heritage asset.
- Church of All Saints, Crondall (Asset 516) is within Crondall Conservation Area. It has significant views to the north west over Parsonage Green which contribute to the setting of the church. The church is surrounded by a churchyard with lychgate and is screened from properties to the south by mature trees and vegetation. The temporary, short term nature of the construction and the location of the Order Limits 500m to the south of the Church of All Saints, Crondall would have no impact on the setting of the heritage asset.
- The Church of All Saints, Laleham (Asset 998), sits within a residential area with close views and a church yard and a tight setting. The temporary, short term nature of the construction and the location of the Order Limits 1000m to the east of the Church means the Project would have no impact on the setting of the heritage asset.
- The Church of St Mary Magdalene, Littleton (Asset 1098), is surrounded by large scale development, including Shepperton Studios, which reduces the setting to its surrounding church yard. The temporary, short term nature of the construction

and the location of the Order Limits 850m to the west of the Church means the Project would have no impact on the setting of the heritage asset.

- Durley Mill and Mill House (Asset 61) is now a single dwelling. The immediate setting of the heritage asset comprises non-designated features including the mill wheel, a granary, a central water course and other machinery. These all contribute to the value of the heritage asset by enabling an understanding of the form and function of the mill. However, the temporary, short term nature of the construction and the location of the Order Limits 800m to the north of Durley Mill and Mill House means the Project would have no impact on the setting of the heritage asset.
- Church of St Mary Magdalene, West Tisted (Asset 188), is set well back from the road within a church yard and surrounded by mature trees. The temporary, short term nature of the construction and the location of the Order Limits 550m to the north west of the Church means the Project would have no impact on the setting of the heritage asset.
- Soames Place (Asset 193) a medieval timber framed hall lies at the foot of a north facing scarp, with fields rising to the south. Soames Place is set within trees away from Soames Lane. The setting of Soames Place does not make any contribution to the value of the heritage asset.
- The Grade II* listed buildings of Church of St Nicholas (Asset 254), The Manor House (Asset 258), and Chawton House (Asset 266) are all to the north of Chawton House Registered Park. Their setting is derived from their relationship with the village, the avenue of trees leading westwards towards the Gosport and Old Winchester Road to the west and the parkland to the south and east. However, the temporary, short term nature of the construction and the location of the Order Limits 800m to the south of this group of assets means the Project would have no impact on the setting of the heritage assets.
- The Grade II* listed buildings of Cruck Cottage (Asset 280), and the Church of All Saints (Asset 289) are within the Upper Faringdon Conservation Area, Manor House Farmhouse (Asset 281) is outside the Conservation Area to the north. The setting of the church is derived from long views and its dominant position within the village. Cruck Cottage has a tighter setting representing the small scale cottages and houses that characterise Upper Farringdon. Manor House Farmhouse is set a little apart from the agricultural buildings and farmyard. The temporary, short term nature of the construction and the location of the Order Limits 700m to the south of the Church of All Saints means the Project would have no impact on the setting of the heritage asset.
- Bonham's Farmhouse (Asset 342), sits within open fields with agricultural buildings to the north east and woodland to the south west, the setting is agricultural in nature with long views. The temporary, short term nature of the construction and the location of the Order Limits 400m to the south of Bonham's Farmhouse means the Project would have no impact on the setting of the heritage asset.
- Silvester's Farmhouse (Asset 441) is on the east of a range of seventeenth, eighteenth and nineteenth century agricultural buildings. Although these contribute the understanding of the asset since the seventeenth century its origins

as a late medieval timber-framed aisled hall is best understood by its location on the eastern outskirts of Lower Froyle. The temporary, short term nature of the construction and the location of the Order Limits 670m to the south of Silvester's Farmhouse means the Project would have no impact on the setting of the heritage asset.

Effects on Grade II Listed Buildings during all stages of the Project would be scoped out. The historic buildings would not be sensitive to these activities.

- Hussey's (Asset 449), is down a small intimate lane with surrounding properties and extensive views to and from the west. The temporary, short term nature of the construction and the location of the Order Limits 530m to the south of Hussey's means the Project would have no impact on the setting of the heritage asset.
- Church of St Mary (Asset 483), on the northern edge of the village has open views to and from the north. However, the temporary, short term nature of the construction and the location of the Order Limits 885m to the north of the Church means the Project would have no impact on the setting of the heritage asset.
- Brook Place (Asset 822), on the southern side of the A319 700m south of the Order Limits. The setting of Brook Place does not make any contribution to the value of the heritage asset.
- Pyrcroft Place (Asset 936) is on the northern edge of a residential area 900m to the north of the Order Limits. The setting of Pyrcroft Place does not make any contribution to the value of the heritage asset.

9.4.15 Based on this any effect on Grade I and II* Listed Buildings is not on a scale likely to result in significant effects, and they would be scoped out of the EIA for construction stage effects (Planning Inspectorate Advice Note 7 question 3).

9.4.16 Grade I and II* Listed Buildings are only sensitive to the potential for Marker Posts to impact their setting during operation. Using the criteria for the assessment of impact set out in Table 9.5 this would not be on a scale that would result in significant effects. Based on this, Grade I and II* Listed Buildings would be scoped out of the EIA with regard to effects during operation.

Historic Buildings – Grade II Listed Buildings

9.4.17 The Order Limits have been selected to reduce the impact on historic buildings by avoiding listed buildings (see Chapter 4). There are no Grade II Listed Buildings within the Order Limits.

9.4.18 Therefore, during construction there is no potential impact pathway which could lead to historic buildings being damaged. Based on this Grade II Listed Buildings should be scoped out of the EIA for construction stage effects (Planning Inspectorate Advice Note 7 question 1).

9.4.19 Any impact on the setting of Grade II Listed Buildings would be short term and temporary. Using the criteria for the assessment of impact set out in Table 9.5 this would not be on a scale that would result in significant effects on Grade II Listed Buildings. Based on this Grade II Listed Buildings should be scoped out the EIA for construction (Planning Inspectorate Advice Note 7 questions 2 and 3).

9.4.20 Grade II Listed Buildings are only sensitive to the potential for Pipe Markers to impact their setting of during operation. Using the criteria for the assessment of impact set out in Table 9.5 this would not be on a scale that would result in significant effects. Based on this Grade II Listed Buildings would be scoped out of the EIA with regard to effects during operation.

Historic Buildings – Conservation Areas

9.4.21 The Order Limits have been selected to reduce the impact on historic buildings by avoiding Conservation Areas where practicable. However, four Conservation Areas; Lower Froyle, Crondall, Basingstoke Canal and Farnborough Hill have the potential for a physical impact and an impact on setting.

9.4.22 During construction there would be potential for Conservation Areas or their settings to be damaged. Using the criteria for the assessment of impact set out in Table 9.5 this would not be on a scale that would result in significant effects. Based on this Conservation Areas should be scoped out of the EIA for construction stage effects (Planning Inspectorate Advice Note 7 question 3).

Conservation Areas would be scoped out of the EIA for all stages of the Project. This is because the works would not be on a scale that would result in significant effects.

9.4.23 Conservation Areas are only sensitive to the potential for Pipe Markers to impact their setting of during operation. Using the criteria for the assessment of impact set out in Table 9.5 this would not be on a scale that would result in significant effects. Based on this Conservation Areas would be scoped out of the EIA with regard to effects during operation (Planning Inspectorate Advice Note 7 questions 2 and 3).

Historic Buildings – Non-designated

9.4.24 The route has been developed to reduce the impact on historic buildings by avoiding them. There are no non-designated Historic Buildings within the Order Limits.

9.4.25 Therefore, during construction there would be no potential impact pathway which could lead to historic buildings being damaged. Based on this, non-designated Historic Buildings would be scoped out the EIA for construction stage effects (Planning Inspectorate Advice Note 7 question 1).

9.4.26 Any impact on the setting of non-designated Historic Buildings would be short term and temporary. Using the criteria for the assessment of impact set out in Table 9.5 this would not be on a scale that would result in significant effects on non-designated Historic Buildings. Based on this, non-designated Historic Buildings would be scoped out of the EIA for construction stage effects (Planning Inspectorate Advice Note 7 question 3).

Non-designated historic buildings would be scoped out of the EIA. This is because during construction there would be no direct impact pathway.
During operation, works would not be of a scale that would result in significant effects.

9.4.27 Non-designated Historic Buildings would only be sensitive to the potential for Pipe Markers to impact their setting of during operation. Using the criteria for the assessment of impact set out in Table 9.5 this would not be on a scale that would result in significant effects. Based on this non-designated Historic Buildings would be scoped out of the

EIA with regard to effects during operation (Planning Inspectorate Advice Note 7 questions 2 and 3).

Historic Landscapes

9.4.28 The route has been developed to reduce the impact on historic landscapes by avoiding Registered Parks and Gardens. However, within the rural area in particular, many non-designated landscape features, such as hedges and other boundaries are important components of historic landscapes.

9.4.29 Therefore, during construction there would be a potential impact pathway to this group of receptors. This could lead to historic landscapes or their setting being damaged. This impact has potential to be on a scale that may result in significant effect. Based on this, historic landscapes would be scoped into the EIA for construction stage effects.

9.4.30 Historic landscapes would only be sensitive to the potential for Pipe Markers to impact their setting of during operation. Using the criteria for the assessment of impact set out in Table 9.5 this would not be on a scale that would result in significant effects. Based on this, historic landscapes would be scoped out of the EIA with regard to effects during operation (Planning Inspectorate Advice Note 7 questions 2 and 3)

Effects of construction on historic landscapes during construction are scoped in.

Effects during operation would be scoped out with appropriate mitigation contained within Chapter 4, the remains would not be sensitive to these activities.

9.5 Impact Assessment Methodology

9.5.1 The impact assessment methodology presented here is based on the generic methodology presented in Chapter 6. Assessment of the value of heritage assets and the magnitude and significance of impacts would be undertaken based on the guidance provided by the Design Manual for Roads and Bridges, DMRB HA 208/07, Cultural Heritage (Highways Agency, 2007) HA208/07. This is the only guidance available for linear developments which sets out a methodology for assessing the value of the heritage asset and the significance of the effects of the route.

9.5.2 The criteria for the assessment of value of heritage assets, sub-divided by receptor group (archaeological remains, historic buildings and historic landscapes) is set out Table 9.4 below.

Table 9.4 Criteria for the assessment of heritage value

Value	Criteria
Archaeological remains	
High	World Heritage Sites (including nominated sites). Assets of acknowledged international importance. Scheduled Monuments (including proposed sites). Undesignated assets of schedulable quality and importance. Assets that can contribute significantly to acknowledged national or international research objectives.
Medium	Designated or undesignated assets that contribute to regional research objectives.
Low	Designated and undesignated assets of local importance. Assets compromised by poor preservation and/or poor survival of contextual associations. Assets of limited value, but with potential to contribute to local research objectives
Negligible	Assets with very little or no surviving archaeological interest.
Unknown	The value of the site has not been ascertained.
Historic buildings	
High	Structures inscribed as of universal importance as World Heritage Sites. Scheduled Monuments with standing remains. Grade I and Grade II* Listed Buildings. Other listed buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade. Conservation Areas containing very important buildings. Undesignated structures of clear international or national importance.

Medium	Grade II Listed Buildings. Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historical associations. Conservation Areas containing buildings that contribute significantly to its historic character. Historic Townscape or built-up areas with important historic integrity in their buildings, or built settings (e.g. including street furniture and other structures).
Low	'Locally Listed' buildings. Historic (unlisted) buildings of modest quality in their fabric or historical association. Historic Townscape or built-up areas of limited historic integrity in their buildings, or built settings (e.g. including street furniture and other structures).
Negligible	Buildings of no architectural or historical note; buildings of an intrusive character.
Unknown	Buildings with some hidden (i.e. inaccessible) potential for historic significance.
Historic landscapes	
High	World Heritage Sites inscribed for their historic landscape qualities. Designated historic landscapes of outstanding interest. Undesignated landscapes of outstanding interest. Undesignated landscapes of high quality and importance, and of demonstrable national or international value. Well preserved historic landscapes, exhibiting exceptional or considerable coherence, time-depth or other critical factor(s).
Medium	Designated special historic landscapes. Undesignated historic landscapes that would justify special historic landscape designation, landscapes of regional value. Averagely well preserved historic landscapes with reasonable coherence, time-depth or other critical factor(s).
Low	Robust undesignated historic landscapes. Historic landscapes with importance to local interest groups. Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations.
Negligible	Landscapes with little or no significant historical interest.

Unknown	World Heritage Sites inscribed for their historic landscape qualities. Historic landscapes of international value, whether designated or not. Extremely well preserved historic landscapes with exceptional coherence, time-depth, or other critical factor(s).

9.5.3 An impact is defined as a change resulting from the options that affect the cultural heritage resource. The magnitude of the impact would be assessed taking into account any agreed mitigation. The criteria to be considered in the assessment of the magnitude of impact for archaeological remains, historic buildings and historic landscapes are set out in Table 9.5 below.

Table 9.5 Criteria for the assessment of magnitude of impact

Magnitude of Impact	Criteria
Archaeological remains	
Large	Change to most or all key archaeological materials, such that the resource is totally altered. Comprehensive changes to setting.
Medium	Changes to many key archaeological materials, such that the resource is clearly modified. Considerable changes to setting that affect the character of the asset.
Small	Changes to key archaeological materials, such that the asset is slightly altered. Slight changes to setting.
Negligible	Very minor changes to archaeological materials or setting, including short term, less than four weeks, temporary changes.
No Change	No change.
Historic buildings	
Large	Change to key historic building elements, such that the resource is totally altered. Comprehensive changes to setting.
Medium	Changes to many key historic building elements, such that the resource is significantly modified. Changes to setting of an historic building, such that it is significantly modified.
Small	Changes to key historic building elements, such that the asset is slightly different. Changes to setting of an historic building, such that it is noticeably changed.

Negligible	Slight changes to historic buildings elements or setting that hardly affect it, including short term, less than four weeks, temporary changes
No Change	No change to fabric or setting.
Historic landscapes	
Large	Change to key historic landscape elements, such that the resource is totally altered. Comprehensive changes to setting.
Medium	Changes to many key historic landscape elements, such that the resource is significantly modified. Changes to setting of an historic landscape, such that it is significantly modified.
Small	Changes to key historic landscape elements, such that the asset is slightly different. Changes to setting of an historic landscape, such that it is noticeably changed.
Negligible	Slight changes to historic landscape elements or setting that hardly affect it, including short term, less than four weeks, temporary changes
No Change	No change to fabric or setting.

9.5.4 The matrix for the assessment of significance of effects is as shown in Chapter 6 with allowance for professional judgement. For the purposes of the assessment, an effect judged to be moderate or greater will be regarded as significant.

Methodology

9.5.5 There is potential for significant effects on archaeological remains, historic buildings and historic landscapes. However, the extent of this is unclear and further assessment will be undertaken to obtain sufficient information. The study area would be defined as a 300m buffer around the Order Limits. The assessment for archaeological remains would comprise a Desk Based Assessment, an Archaeological Geophysical Survey and Archaeological Trial Trenching (if required).

9.5.6 More details of these surveys are set out in Appendix 3 - Survey Methodology Report

9.5.7 The Desk Based Assessment would cover archaeological remains, historic buildings and historic landscapes. It would be carried out in accordance with the Chartered Institute for Archaeology's Standard and Guidance for Historic Environment Desk-Based Assessment (CIfA, 2017), and would comprise:

- Obtaining updated data from the relevant HERs;
- Inspection of aerial photographs held by the Historic England Archive;
- Inspection of additional sources held by the Hampshire, Winchester, Surrey and Greater London HERs. These may include reports on previous investigations, and local and regional cultural heritage literature held in their further information files;

- Inspection of Historic Landscape Characterisation data produced for the South Downs National Park Authority;
- Inspection of sources held by the Hampshire Records Office, the Surrey History Centre, and the London Metropolitan Archive including historic Ordnance Survey and pre-Ordnance Survey mapping. Also local and regional cultural heritage literature;
- A walkover survey to determine the effects of the Project on archaeological remains, historic buildings and historic landscapes; and
- Engagement with heritage advisors to the local planning authority to inform identification of the need for, nature, scope and scale of archaeological evaluation in support of the application.

9.5.8 A programme of archaeological evaluation in the form of an Archaeological Geophysical Survey of appropriate, accessible areas within the Order Limits area may be undertaken if indicated. These areas would be determined based on suitability for geographical survey and the results of the Desk Based Assessment. The extent and location of the Archaeological Geophysical Survey would be informed by engagement with Historic England and the local authority heritage advisors. This would be influenced by underlying geological conditions and previous successful use of the technique. This would help identify the presence or absence, extent and character of buried archaeological remains within the Order Limit area.

9.5.9 The results of these assessments would be used to determine, through engagement with Historic England and the local authority heritage advisors, the requirement for any intrusive archaeological evaluation by trial excavation. The results of these surveys will be used to inform the assessment within the Environmental Statement and the need for, and design of, further evaluation or mitigation measures.

9.5.10 Any proposed evaluation and subsequent mitigation would be designed with reference to the research aims contained in the South East of England Research Framework and the Solent Thames Regional Research Framework. They would be developed in consultation with Historic England and the local authority heritage advisors.

9.6 Summary Scope for the EIA

9.6.1 There is the potential for significant effects on archaeological remains, historic buildings and historic landscapes during construction of the Project. Effects on the setting of designated assets within the 300m to 1km study area have been scoped out. Effects on archaeological remains, historic buildings and historic landscapes during operation and decommissioning of the Project have also been scoped out.

9.6.2 A summary of the receptors considered and scoped in or out is set out in Table 9.6.

Table 9.6: Matters of concern for historic environment

Receptor	Matter / potential effect	Locations	Comments
Archaeological Remains	Potential for the removal of known and unknown archaeological remains during construction.	Within 300m of Order Limits	Scoped in.
Historic Buildings	Potential for an effect on the setting of historic buildings through visual and noise intrusion during construction. Physical impact on assets.	Within 1km of Order Limits	Scoped out. The short term temporary nature of effects on setting is of such scale that no significant effect is predicted. There are no impact pathways to historic buildings identified for any physical impact on the heritage assets.
Historic landscapes	Potential for the removal of key historic landscape elements during construction	Within 300m of Order Limits	Scoped in.
Archaeological remains	Setting of designated assets.	Between 300m and 1km from Order Limits	Scoped out. No impact pathways have been identified
Historic buildings	Setting of designated assets.	Between 300m and 1km from Order Limits	Scoped out. No impact pathways have been identified
Historic landscapes	Setting of designated assets.	Between 300m and 1km from Order Limits	Scoped out. There are no designated historic landscapes within the 1km study area that are not within the 300m study area

Receptor	Matter / potential effect	Locations	Comments
Archaeological remains	During operation	Within 1km of Order Limits	Scoped out The majority of the Project is underground, with any new above ground structures of such small scale that there would be no significant effect on any heritage assets
Historic Buildings	During operation	Within 1km of Order Limits	Scoped out The majority of the Project is underground, with any new above ground structures of such small scale that there would be no significant effect on any heritage assets
Historic landscapes	During operation	Within 1km of Order Limits	Scoped out The majority of the Project is underground, with any new above ground structures of such small scale that there would be no significant effect on any heritage assets

Chapter 10
Landscape and Visual

Scoping Report Volume 1

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10. Landscape and Visual Effects

10.1 Introduction

10.1.1 The landscape takes its character from a mixture of elements, including landform, water courses, land use and pattern, vegetation, open space and cultural heritage influences. Landscapes vary considerably in character and quality, and are a key component of the distinctiveness of any local area.

10.1.2 To a large extent, human beings experience the landscape visually. The quality of views available in any given area can influence the quality of life. The Project has the potential to have a physical effect on the landscape and on views from surrounding receptors. A distinction can therefore be made between:

- Landscape character and the elements and features that contribute to it (landscape receptors); and
- People who experience the visual amenity offered by the landscape (visual receptors).

10.1.3 In this chapter, the landscape and visual baseline of the study area is outlined, and the potentially significant landscape and visual effects are identified. The scope of the landscape and visual impact assessment for the EIA and the technical methodology are described.

10.1.4 The Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3), (Landscape Institute and Institute of Environmental Management and Assessment, 2013) promote landscape and visual impact assessment that is proportional to the scale and nature of the proposals and the likely landscape and visual effects.

10.1.5 A proportionate approach to the scope of the landscape and visual impact assessment for the EIA is set out within Section 10.5 Impact Assessment Methodology.

10.1.6 Published landscape character assessments range in detail from the broader national scale to the more detailed county and district scales. To achieve a proportionate approach to the landscape assessment, effects will be based on the larger scale published national character areas (see Table 10.1).

10.1.7 Within the South Downs National Park (SDNP), landscape effects would also be assessed against the published SDNP Integrated Landscape Character Areas (see Table 10.3) because of the nationally recognised sensitivity of the landscape. This assessment approach has been requested by the SDNP Authority.

10.1.8 A selection of representative viewpoints (see Appendix 3 Scoping Survey Methodology Report, Table 3.1) will be used to assess visual effects. These will be selected to show the most significant visual effects because of their high sensitivity (see Table 10.8), their closeness to the proposals and the likely change in existing view. This is a commonly adopted proportionate approach described within GLVIA3. It is often used where there are large numbers of

visual receptors and where effects are likely to be similar throughout a large area.

10.1.9 This chapter is based on a desktop survey and the findings of the Winter Landscape Survey, which was carried out in February 2018.

10.1.10 Chapter 10 was written by a technical expert in the field of landscape and is currently employed by Jacobs. She has over 14 years' experience in the consultancy sector. Her qualifications are BA (Hons) Landscape Architecture and Town and Regional Planning, DIP Landscape Architecture (University of Sheffield). She has been a Chartered Member of the Landscape Institute since 2008.

10.2 Legal Requirements

National Policy

Overarching National Policy Statement for Energy (NPS EN-1)

10.2.1 This overarching national policy accepts that the landscape and visual effects of energy projects will vary on a case by case basis according to the type of development, its location and the landscape setting of the proposed development. The guidance is consistent with GLVIA3. GLVIA3 aims to promote design taking account of potential impact on the landscape and views and which applies appropriate mitigation.

10.2.2 The guidance reiterates the National Planning Policy Framework (NPPF) (referenced below) in terms of the high status of protection within National Parks in relation to landscape and scenic beauty, and the consideration given within the decision making process for major development proposals within National Parks.

10.2.3 Specific parts of NPS EN-1 that are relevant to landscape are as follows:

- Paragraph 5.9.8 - 9 refers to the need for the Infrastructure Planning Commission (now the Planning Inspectorate and Secretary of State for Business, Energy and Industrial Strategy) to have regard to the statutory purposes for which National Parks and Areas of Outstanding Natural Beauty (AONB) were designated;
- Paragraph 5.9.10 sets out the approach to energy infrastructure development proposed within nationally designated areas and broadly follows the tests for major development in nationally designated landscapes which is set out in the NPPF;
- Paragraph 5.9.11 sets out the need to ensure that infrastructure projects in these areas are carried out to high environmental standards;
- Paragraph 5.9.12 &13 sets out the considerations for infrastructure projects which might affect the statutory purposes of designated areas from beyond their boundaries – i.e. in the setting of the designated area;
- Paragraph 5.9.18 – 5.9.20 covers the approach to visual impact; and
- Paragraph 5.9.21 – 5.9.23 covers the approach to mitigation of landscape and visual impact.

National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (NPS EN-4)

10.2.4 This guidance refers to the considerations to be given to landscape and visual effects, the content of assessment and emphasis on mitigation as detailed within NPS EN-1.

10.2.5 Whilst EN-1 and EN-4 remain the prime decision making documents, where they do not provide guidance, the following may also be considered important and relevant guidance that may require consideration by the decision making

authority. At this stage it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State and it is included for completeness to allow the Secretary of State to make such a determination. In considering these policies it should be noted that the Local Authorities and SDNPA are not the decision maker for the Project.

National Planning Policy Framework (NPPF)

10.2.6 The following overarching policies within the NPPF are broadly relevant to landscape:

- *Policy 7 Requiring good design.* This policy promotes the integration of new development into the natural, built and historic environment. The alignment of the route and the reinstatement of the landscape will be considered in this regard.
- *Policy 9 Protecting Green Belt Land.* This policy seeks to prevent urban sprawl, and to maintain the openness of land.
- *Policy 11 Conserving and enhancing the natural environment.* This policy emphasises the need to contribute, protect and enhance valued landscapes, and states that great weight should be given to conserving landscape and scenic beauty in National Parks. The extent of negative impacts on the landscape, and the extent to which these could be reduced are taken into account within the decision making process for major development proposals within National Parks.

Local Policy

South Downs National Park

10.2.7 At its southern extent, the route and associated Order Limits pass through approximately 20km of the SDNP between Bishops Waltham and Alton (within parts of Sections A and B – see Chapter 3, Table 3.1 and Figure 3.2 for the route sections). Designated for its exceptional natural beauty and as a landscape of national importance in 2010, the SDNP covers over 1600km^2 of lowland landscape stretching from Winchester in the west to Eastbourne in the east. The key purpose of the National Park of relevance to landscape is to conserve and enhance the natural beauty.

10.2.8 The South Downs National Park Partnership Management Plan 2014 – 2019 comprises the five-year strategy for the management of the SDNP. The plan provides the framework for the emerging park-wide Local Plan. A series of detailed policies are set out, which essentially aim to support the key purposes of the SDNP.

10.2.9 The SDNP Authority is currently preparing its Local Plan, which will replace all existing planning policies across the SDNP (see Appendix 2 for details). Until this is adopted, the 'Development Plan' for the SDNP Authority consists of adopted plans and policies relevant to the local planning authorities it covers. The background landscape evidence relevant to the emerging Local Plan provides useful baseline information for this assessment and is outlined below

and in 10.3.10 – 10.3.11 and Table 10.3.

Local Plan South Downs National Park: Characterisation and Analysis (Land Use Consultants, 2015)

10.2.10 Views are considered a special quality of the SDNP, which should be protected and conserved. The study identifies views and landmarks in the SDNP. The extent of visibility from each view and landmark is mapped to help assess and understand the extent of views. Two viewpoints have been identified close to the route:

- 47 Wheely Down – this location is noted for views over the Meon Valley and is noted in published literature regarding the Monarch's Way (Monarch's Way Book 3: Charmouth to Shoreham, Trevor Antill 1996). The viewpoint is approximately 1km from the route; and
- 54 Wayfarer's Walk at Wind Farm – its location on the South Downs Way provides good views north.

South Downs National Park Authority Tranquillity Study, 2017

10.2.11 Tranquil and unspoilt places are a special quality of the SDNP. This study maps tranquillity to help protect and enhance areas of high tranquillity within the SDNP. Much of the study area has been assessed as being of moderate to high tranquillity, although tranquillity decreases to moderate to low around the A32 and A272 road corridors and close to larger settlements including Alton.

South Downs National Park Authority Settlement Context Study Report and User Guide, 2017

10.2.12 This study provides a strategic overview of the landscape context of the settlements in the SDNP. It aims to provide information regarding constraints and opportunities in relation to proposed development. Views out of settlements are mapped, and those associated with Chawton are relevant to Section B of the route.

Local Landscape Designations

10.2.13 Areas of landscape importance fall within the study area (Sections G and H). These are designated within the adopted Local Plan for Runnymede (Runnymede Borough Local Plan Second Alteration 2001 identifies policy NE8, which is a saved policy within Runnymede Borough Council Local Plan Saved Policies 2007).

10.2.14 The route would run through Woburn Hill and Chertsey Meads area of landscape importance (Section G). This area has been designated for its particular landscape importance in relation to its prominence and setting and extensive tree cover.

Local Plans

10.2.15 Appendix 2 identifies the Local Plans relevant to the districts and boroughs which would be affected by the replacement pipeline. There are policies relevant to landscape, and these will be considered in more detail within the

ES. The key landscape related legislative themes common throughout the Local Plans are:

- Protection of the SDNP;
- Protection of locally designated landscapes;
- Respecting landscape character and protection of the countryside;
- Protection of trees and vegetation;
- Protection of heritage landscape features and their settings;
- Conservation and enhancement of green infrastructure;
- Promoting good quality design; and
- Retaining openness within the Green Belt and other identified open spaces.

10.3 Baseline Conditions

Study Area

10.3.1 The main study area for the scoping assessment covers up to 1km from the proposed Order Limits. This was set to provide an understanding of the wider landscape context and constraints. Long distance viewpoints over 1km have also been considered where they relate to particularly sensitive views. For example, long distance and panoramic views which are located within areas promoted for tourism or which feature in published material (see Appendix 3 Scoping Survey Methodology Report, Table 3.1).

Landscape Character

10.3.2 Landscape character assessments help the landscape professional gather an understanding of the baseline landscape against which changes can be assessed.

10.3.3 The existing character of the landscape has been established using published landscape character assessments. During this process landscape elements and features were examined. Landscape elements include geology, landform, vegetation and land use as well as more perceptual characteristics such as landscape patterns and cultural heritage. Landscape features are elements that have a particular prominence and/or importance. Landscape character is described on the basis of distinct, recognisable and consistent combinations of elements and features.

10.3.4 The character areas considered within this chapter are restricted to the extent of published landscape character areas that would be directly affected by the Project.

10.3.5 Published national and county landscape character areas, and published landscape character areas within the SDNP, are detailed below. The key characteristics of relevance to the Project are set out in Tables 10.1 – 10.3. The landscape character areas within each table are listed from south to north. The route can be seen in the context of the published national, county and SDNP landscape character areas within Figures 10.1 – 10.3.

10.3.6 More detailed landscape character assessments have been published. However, these have not been considered within the baseline because they do not give full coverage across the study area and they are inconsistent in scale. Also, it would not be proportionate to the scale of the Project to incorporate information from these more detailed studies.

National Scale

10.3.7 Natural England have identified national character areas throughout England that share similar landscape characteristics. These are large, national scale, landscape character areas. The route would run through six national character areas, shown with their key characteristics in Table 10.1 and in Figure 10.1.

County Scale

10.3.8 Published landscape character areas at county scale are smaller than the national scale landscape character areas, so there are usually more of these per geographical area.

10.3.9 At a county scale, the landscape within the study area has been assessed within Hampshire Integrated Character Assessment (Hampshire County Council, 2012) and Surrey Landscape Character Assessment (Hankinson Duckett Associates 2015). Landscape character areas have been assessed at a similar scale within these two studies, so that they provide a consistent baseline for the current assessment. The route would run through the county landscape character areas, identified along with their key characteristics within Table 10.2 and Figure 10.2.

South Downs Integrated Character Assessment

10.3.10 The South Downs Integrated Character Assessment (Land Use Consultants, 2011) identifies the landscape characteristics of the SDNP. The assessment draws on historic landscape characteristics which are considered in further detail within the Historic Landscape Characterisation Report, South Downs National Park (Wyvern Heritage and Landscape, 2017).

10.3.11 Development proposals will be expected to conserve and enhance landscape character within the SDNP. The route would run through the landscape character areas identified in Table 10.3, along with relevant key characteristics, and on Figure 10.3.

Table 10.1: National character areas (Natural England)

Section	National character area	Key characteristics of relevance
A	128: South Hampshire Lowlands	• Low lying plain between the chalk hills of the Hampshire and South Downs and Southampton Water; • In rural areas the landscape comprises a mixture of farmland, particularly pasture and woodland; • Well wooded landscape, where ancient woodland forms a legacy of the Forest of Bere, a royal hunting forest that once covered the area; • Intimate and enclosed field pattern, with many small and irregular fields enclosed by native hedgerows or woodland; and • Chalk rivers in wide, open valleys.
A	125: South Downs	• A broad elevated east-west chalk ridge, with a predominantly steep north facing scarp slope and a gentle southerly dip slope; • Woodland is a feature of the central downs, and consists of broadleaved and mostly ancient woodland commonly comprising beech, ash and sycamore; • Roads and villages concentrated in river valleys, and more elevated areas sparsely settled with scattered farmsteads; and • Public Rights of Way (PRoW) often follow drove roads and ancient routes along the accessible downland tops, benefiting from panoramic views across the downs.
A, B, C	130: Hampshire Downs	• Rolling, elevated, chalk arable downland, with an open and exposed character that provides long views; • Network of hedgerows, interspersed by numerous areas of oak/ash or woodland coppice and smaller meadow fields, gives a strong sense of enclosure; • Network of distinctive and ancient droving roads and trackways; and • Low density settlements on the downs.

Section	National character area	Key characteristics of relevance
C	120: Wealden Greensand	• A long, narrow belt of greensand, typified by scarp and dip slope topography; • Undulating landform gives a sense of intimacy to the landscape; • Extensive areas of ancient woodland of hazel, oak and birch, with some areas having been converted to sweet chestnut coppice; • Remnant lowland heathland; and • Mosaic of mixed farming, with pasture and arable land set within a wooded framework.
C, D, E, F, G	129: Thames Basin Heaths	• High woodland cover - legacy of historic hunting forests includes ancient woodland, ancient hedgerows and parklands; • Acidic soils and heathland character where heather, gorse, oak and birch species thrive; • Small to medium sized fields within large areas of heathland and woodland; and • Historic commons offer tranquillity and unenclosed views.
G, H	115: Thames Valley	• Flat and low lying land; • Hydrological features including the River Thames and its tributaries provide unity to an area which otherwise lacks homogeny; • Densely developed with pockets of woodland, open grassland, parkland, wetlands and intimate meadows; and • Strong urban influences including road and rail infrastructure, Heathrow Airport, reservoirs, extensive mineral extraction and flooded gravel pits.

Table 10.2: County Landscape Character Areas

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
A	Forest of Bere West	• A low lying landscape with shallow undulations, predominantly south sloping; • Locally popular accessible woodland areas; • Permanent pasture, plantations woodland and small holdings with secluded, heavily wooded, often ancient origin but replanted, away from the major towns; • This area is strongly associated with the Royal Forest of Bere, a hunting reserve that retains wooded and to a lesser extent, open commons, assart field and woodland patterns; • Hedgerows often low but with individual spreading mature oaks, sometimes of ancient origin or lines of oak with no 'understory' hedge and occasionally isolated field specimens; and • Rich biodiversity, including woodland, heathland, grassland and wetland sites.
A	Hamble Valley	• Well defined strong valley landform with dense semi natural woodland which clothes the valley sides and tops.
A	Owslebury and Corhampton Downs	• Large scale, frequently undulating, rolling landform characteristic of the chalk dipslope, dissected by dry valleys; • Strong pattern of woodland cover, from small copses and spinneys to large mixed woodland and ancient woodland of national importance, and hedgerows providing a sense of enclosure; • Occasional areas of remnant downland with areas of unimproved chalk grassland and associated wooded scrub, and occasional wooded hangers; • Large areas of early assarted enclosures and informal enclosures resulting in varied field size and patterns defined by thick hedgerows; • Low density dispersed pattern of villages, hamlets and farmsteads; • Scattered distribution of manor parks and high proportion of medieval and 17th C origin

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
		farmsteads linked by sinuous lanes; • Well established PRoW and long distance routes, with drove links to the adjoining valley landscapes of the Itchen and Meon and to the Forest of Bere to the south; and • Rural, remote and secluded character occasionally commanding long distance views, predominantly to the south.
A	East Winchester Open Downs	• Topographically varied and striking rolling landscape including steep scarps, extensive branching dry valleys systems which produce deep, narrow, rounded combes; • Dominated by large 18th and 19th century fields of arable and pasture, bounded by sparse thorn hedgerows, creating an open landscape; • Tracks surviving from the earlier manorial downland landscape are important historic landscape features; • Occasional areas of species rich unimproved chalk grassland occur, and game coverts, linear tree features and visually distinctive beech clumps on hill tops (notably at Cheesefoot Head and Beacon Hill); • A strong sense of remoteness and tranquillity away from the major transport routes (M3, A31, A272) which cross the landscape; and • Good public access with a network of PRoW, including the South Downs Way national trail, and open access land at Magdalen Hill Down and St Catherine's Hill.
A, B	Bighton and Bramdean Downs	• Undulating topography comprising series of ridges and dry valleys; • Heavy although free draining soils with significant areas of woodland; • Fields are defined by hedgerows to create a mixed scale pattern; • Significant areas of ancient woodland (some assarted) particularly on higher areas with some replanted; and

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
		• Well settled landscape with notable parkland areas often associating with small nucleated settlement in the Ropley area.
B	East Hampshire Wooded Downland Plateau	• An elevated plateau landscape, mainly fairly flat but with dry chalk valleys, creating gentle undulations; • Characterised by being one of the most wooded downland areas in the County, comprising large woodland blocks to small copses and ancient hedgerows which are well connected; • There is strong survival of early enclosure field systems and particularly fields bounded by tracks and lanes; • Abundance of 18th and 19th century farmsteads connected by a dense rights of way network including byways open to all traffic; • Settlements tend to be small, often hamlets and small villages located at the edge of the character area or in elevated locations within the area; and • A landscape of contrasting views, from panoramic and far reaching to very enclosed, but always heavily wooded.
B	Newton Valance Farrington and East Tisted Downs	• Gently rolling chalk landscape comprising rounded knolls and ridges, and dry chalk valleys; • Areas of heavy clay soils support woodland blocks, many of which are ancient; • Land use comprises a matrix of pasture and arable with notable areas of beech hanger woodland; • Enclosure patterns reflect mainly 15th to 17th century enclosure resulting in small scale wavy field patterns and areas of more recent field amalgamation with former drove routes and open field boundaries still evident often associated with sunken lanes and thick banked hedgerows; • Nucleated villages located in sheltered lower lying areas reflect former medieval manorial systems surrounded by open fields; and

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
		• Former deer parks and designed parks of the 18th and 19th centuries exert parkland character in some places e.g. Newton Valence, Chawton, Pelham Place and Rotherfield Park.
B, C	Wey Valley	• Large to medium scaled arable fields cloak the open valley sides; • Woodland in the upper valley slopes form wooded skylines in places; • Valley is and has historically been an important routeway and transport corridor containing the A31 and main rail line; and • St Swithun's Way long distance route, part of the Pilgrim's way which connected Winchester with the North Downs.
C	East Hampshire Hangers and Greensand Terrace	• A dramatic landform dominated by sinuous chalk and greensand scarps marking the edge of the chalk in East Hampshire; • Distinctive hanger woodland in narrow bands following the steep scarp slopes, interspersed with small pasture fields or open chalk downland; • A mixture of extant assarts and ancient woodland and regular enclosures of perhaps medieval and 17th century origin on the terrace; • Varying sense of enclosure/seclusion depending on breadth of greensand terrace; and • Varied views, with occasional dramatic distant views over the Weald and expansive views from the crest of the open chalk ridge at Butser.
C, D	North East Hampshire Open Downs	• Rolling chalk landform with broad sweeping hills and ridges and dry valleys; • Northern areas slope northwards towards the lower lying heaths while southern areas form a gently undulating plateau; • Extensive tracts of intensive arable cultivation defined by well-trimmed hedgerows; • Scattered blocks of woodland habitats and stronger hedgerow structure in southern parts of

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
		the area; • Remote and quiet landscape which is lightly populated with dispersed nucleated villages (including spring line villages at the foot of the chalk) and occasional farmsteads; • Sense of openness, space and expansiveness; and • Nucleated settlement pattern of springline villages along the northern boundary, and small hamlets and villages in dry valleys to the south on higher ground.
D, E	North East Hampshire Plantations and Heath	• Gently undulating landscape of plateau areas dissected by river valleys; • Distinctive 'heathy' character throughout reflected in acidic loving vegetation and giving rise to a colourful landscape through the seasons; • Land use comprises a mosaic of woodland, including conifer plantations, blocks of remnant open heathland and medium scaled pasture fields; • Varied public access network of commons and open land on the heath and rights of way in the river valleys; • Concentration of large parkland landscapes and extensive areas of mineral extraction; • Large urban areas of Aldershot, Farnborough and Fleet and numerous transport corridors (M3, A30, and Basingstoke Canal) and high density of dispersed settlement of common edge origin, and smallholdings; and • Enclosed often intimate character with limited outward views and a sense of remoteness and seclusion despite proximity to populated areas.
Surrey Landscape Character Assessment		
E	Blackwater River	• Flat, low lying flood plain of the Blackwater valley, forming a narrow corridor next to settlement; • Contains a number of lakes formed from gravel pits;

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
	Floodplain	• There are some long views across large lakes, but generally distant views are constrained by tree cover and surrounding settlement; • The Blackwater Valley Footpath Recreational Path crosses through parts of the western edge of the character area, along or nearby the Blackwater River. Apart from a single bridleway which connects with the Blackwater Valley Footpath, there are no other PRoW in the character area; and • Tranquillity and remoteness are significantly limited by urban influence and transport routes. However, wetland areas enclosed by vegetation have a degree of isolation.
E	Deepcut Sandy Woodland	• The character area consists of extensive areas of dense mixed woodland and plantation, and includes some small pockets of more open heathland, and pasture. There are recreational uses including sports pitches, and a golf course set within the woodland; • Views in the majority of the character area are substantially restricted by the tree cover; • There is managed Open Access Land and a number of long distance PRoW through the woodland, providing good walking routes. The Basingstoke Canal travels through the centre of the character area, forming a secluded cutting through the surrounding woodland; • The character area abuts Camberley and surrounds Deepcut, both of which are obscured from view by the surrounding woodland; • Settlement within the character area is limited to a few small groups of dwellings and army barracks, surrounded by woodland; • This is an enclosed, intimate landscape with a keen sense of remoteness and tranquillity, which can be appreciated from the rights of way through the area; and • Human influence, including settlement, and transport routes which are in cuttings through the woodland, are obscured by tree cover which limits urbanising effects on the surrounding

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
		wooded landscape.
F	Westend and Pirbright Sandy Heath and Common	• The character area consists of a large extensive tract of open heath, with scrub and small groups of trees; • There are bands of woodland located along the perimeter of the character area, which prevent views in and out of the character area; • The character area is unsettled, with no public access within the danger area, an exception being the north-east corner where there is a 'B' road, and PRoW; • Two treed areas of Westend Common, are registered as common land outside the danger zone, at the eastern edge of the character area; and • This is a contained inward looking and secluded, 'secret' landscape. With the exception of military activity, there is minor human influence across the area. As a result, this is a remote landscape with surrounding settlement hidden by perimeter vegetation.
F	Windlesham to Knaphill Settled and Wooded Sandy Farmland	• The character area consists of pastoral farmland with dispersed blocks of rectilinear deciduous woodland, often with a substantial amount of Holly. Across the character area there is a light scattering of farmsteads, paddocks, nurseries, and the occasional golf course. There are small areas of common land, fringed with a limited number of houses, and small low density group of dwellings; • Ancient woodland is recorded mainly in the northern part of the character area, such as Manor Farm Wood and Halebourne Copse. Field boundaries and roadsides are well vegetated with a network of hedgerows and trees; • Views across the landscape are generally limited by layers of hedges and woodland blocks; • The character area abuts Built Up Areas in a number of locations, but settlement is largely contained or screened from view by tree cover;

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
		• A limited network of PRoW crosses most parts of the character area, and connects to small areas of Open Access Land which are scattered around the character area, such as Little Heath on the north-eastern edge of Chobham, and Bisley Common to the west of Knaphill; • The character area includes part of a Conservation Area south of Windlesham and abuts a Conservation Area at Chobham. There are a number of small areas registered as common land, the more significant areas including Little Heath and Bisley Common; and • A rural farmland landscape with limited urban influence results in a relatively peaceful landscape. Human influence is present in the form of scattered settlement, nurseries, and golf, but the farmed landscape set within a strong hedgerow network and woodland assists in creating a degree of tranquillity.
F	Windlebrook and Southern Bourne Floodplain	• Flat, low lying floodplain within the surrounding heathland landscape; • The character area is predominately pastoral, with wet meadows and the occasional arable fields. There are pollarded trees and riparian vegetation and woodland along the main watercourses and tributaries across the character area, and a good network of hedgerow field boundaries elsewhere; • Small blocks of woodland and tree groups are scattered across the character area; • Long distance views across are generally contained by vegetation, and woodland along watercourses; • There are a number of PRoW within the character area, allowing good access to the many watercourses; • The character area contains a small number of dwellings, farm buildings and a nursery, and there is limited urban influence overall; and • With its riparian vegetation, meadows, limited urban influence and low-key public access, the

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
		majority of the character area is relatively unspoilt and tranquil.
F	Chobham Sandy Heath and Common	• The character area is formed from large extensive tracts of open heath, with scrub and varying sized tree groups; • Larger blocks of woodland tend to be located at the perimeter of the common, and often include Birch and Pine with Holly edges. There are a number of wide bands of trees across the centre of the character area; • There are long open expansive views across the heath, particularly form high points, looking over scrub to woodland in the distance, such as from Staple Hill and Memorial Cross. Treed areas enclose or frame views in some places; • Cobham Common is a well-used recreational resource for walkers and cyclists. The vast majority of the character area is Open Access Land. PRoW and other tracks crisscross the character area; • The vast majority of the character area is registered as Common Land, and there are two scheduled monuments – earthworks at the 'Bee Garden' on Albury Bottom, and north-west of Childown Farm; and • This an expansive landscape of high ecological value heathland. Human influence, from roads and the M3, and recreational activity does have an effect on the character area in places, but large relatively unspoilt areas with a feeling of tranquillity and remoteness remain.
F	Chobham East Settled and Wooded Sandy	• Consists of pastoral and arable farmland with occasional areas of woodland; • Fields sizes are often larger than other surrounding areas of Settled and Wooded Sandy Farmland; • Fields and paddocks, particularly within the north-western part of the character area have a good hedgerow structure; along their boundaries, but some fields, mainly the larger fields to

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
	Farmland	the south and east have lost their hedgerows • Views are often limited or framed by hedgerows and tree cover, but views become more open to the south; • A good network of PRoW cross the character area; and • There are two small areas of registered common land, including Little Heath at the north-western end of the character area.
F	Wentworth to Sheerwater Settled and Wooded Sandy Farmland	• There are watercourses and ponds throughout the character area; • The character area consists of considerable areas of woodland, including some areas of ancient woodland; • Foxhills and Queenswood golf courses occupy the central part of the character area; • Field boundaries are generally well vegetated with hedges and trees; • Although dispersed, settlement in the form of areas of very low density large dwellings, scattered small groups of settlement and farmsteads, is spread across the majority of the character area, mostly hidden by surrounding tree cover; • Occasionally there are views across fields to the nearest woodland, but long distance views are restricted by tree cover in most parts of the character area; • There is a moderate network of PRoW, but some areas have limited public access due to land uses such as golf; and • Human influence, including settlement is obvious in places, and tempers the sense of remoteness. This is however, generally a secluded landscape, with woodland providing tranquillity.
F	Foxhill Sandy	• The character area gently rises towards Foxhills to the north-east; • The character area consists of extensive areas of mixed woodland, with a few clearings for

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
	Woodland	small groups of secluded houses and isolated dwellings, and occasional ponds; • The minor road which crosses through the woodland, is enclosed on both sides, but has occasional gated driveway entrances; • There are tracks through the woodland, but no PRoW; and • This is a secluded private landscape, with a sense of remoteness due to the sense of enclosure provided by woodland. However, appreciation of the remoteness and tranquillity of the woodland reduced slightly due to the fact that the road through the centre of the character area, with its occasional driveway entrances, is the main point of access and view point.
F, G	Trumps Green to New Haw Settled and Woody Farmland	• A gently undulating landscape; • The character area consists mainly of arable and pastoral farmland, with paddocks, nurseries, golf courses, and a large sewage works; • Woodland blocks are small, and infrequent, particularly to the south; • The field pattern is generally small to medium scale towards the northern part of the character area, bounded by hedges and tree lines, whilst fields to the south are more open; • There are views from St Ann's Hill, north over the floodplain and nearby Thorpe Park. On lower ground views over the northern part of the character area are contained or framed by tree cover. To the south there are more extensive views across farmland; • St. Ann's Hill and the Dingle, and St. Ann's Court are Grade II and Grade II* Registered Parks and Gardens respectively. The remains of St. Ann's hillfort and 14th century chapel are registered as a scheduled monument; and • Some pleasant semi-rural areas, but human influence in the form of internal settlement, surrounding Built Up Areas, and busy vehicular routes (albeit often filtered by vegetation), restricts the sense of remoteness and tranquillity generally.

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
G, H	Thames River Floodplain	• Flat, low lying, wide floodplain of the Thames valley, surrounded by Built Up Areas; • Significant parts of the character area are dominated by large lakes formed from gravel workings. Remaining land includes an irregular pattern of pasture, horse paddocks, occasional arable fields and horticulture, as well as light industry, and recreational uses such as golf; • Relatively open, with some long distance views, particularly across large water bodies towards surrounding settlement; • Major roads, elevated above the floodplain cross through the character area, including a significant stretch of the M3 motorway. A network of other roads criss-cross the character area linking settlements beyond; • The Thames Path National Trail runs along or near the River Thames, and connects with a number of other PRoW across the character area, although there are some areas with limited formal public access; and • There are a few areas isolated by lakes and waterways where there is a degree of remoteness, but most of the character area has limited tranquillity due to internal and surrounding urban influence including Built Up Areas and roads. The River Thames does however exert a strong influence on the character of the area.
H	Ash River Floodplain	• The character area is made up of small to medium scale pastoral fields, occasional arable fields, lakes and earth works from gravel extraction. There are a number of other uses, including golf courses, nurseries, recreation, common land, horse paddocks, and a prison; • There is tree cover mainly associated with water bodies and a golf course, with no significant blocks of woodland. There is a partial hedgerow network bounding fields in places. A small area of ancient woodland is recorded to the west of Shepperton film studios;

Section	Landscape character area	Key characteristics of relevance
Hampshire Integrated Character Assessment		
		• There are some long views across open areas of the floodplain, but distant views are largely contained by surrounding settlement and urban infrastructure; • This is a relativity limited number of PRoW within the character area; and • Open aspect and limited internal settlement allows a degree of rurality compared to the surrounding urban areas, but tranquillity and sense of remoteness are limited.
H	Princes Lakes Significant Greenspace within Urban Areas	• Contains large lakes formed from gravel extraction, plus nearby fields and sports pitches; • There are roads and rail routes towards the perimeter of the area; • There are no PRoW, but there is a focus on recreation in the form of sports pitches and use of the lakes for water sports; and • Bedfont Lakes to the east (within Greater London) have been restored from gravel workings to a successful country park, and could be used as a role model for further restoration of Princes Lake to enhance the areas use as a recreational resource.

Table 10.3: South Downs integrated character assessment

Section	Integrated character type/area	Key characteristics of relevance
A	Landscape Type D: Downland Mosaic	• Large scale rolling landform characteristic of the chalk dipslope, dissected by dry valleys, with localised secondary escarpments marking the division between different formations of chalk; • A prominent ridgeline follows the line of the Meon anticline with a series of upstanding hills located at Butser Hill, Old Winchester Hill and Beacon Hill from which there are panoramic views; • Varying extents of surface clay capping resulting in varying soils, woodland cover, and sense of enclosure. Views are constantly changing from panoramas at high points e.g. Butser Hill, to enclosed views along hedged lanes; • A mixture of 18th and 19th century arable fields and early post medieval pasture fields, with pockets of older medieval assarts surrounded by woodland. This mosaic of habitats supports arable weeds and farmland birds; • A strong pattern of woodland cover, many of which are of ancient origin and some of which are of national importance, and hedgerows providing enclosure which contrasts with the open farmland; • Occasional areas of unimproved chalk grassland and associated woody scrub, including juniper scrub which is of particular biodiversity interest; • A number of different monuments including long barrows, round barrows and linear boundary earthworks are evidence that the land was valued as a ritual landscape; • Iron Age hillforts on the most prominent hills. Panoramic views from these hills have attracted the attention of visitors since the seventeenth century and inspired literary comment;

Section	Integrated character type/area	Key characteristics of relevance
		• A low density of dispersed settlement across the downland with a scattering of nucleated settlement in preferred lower lying areas. Distinctive churches are often landmarks; • A number of minor designed landscapes which indicates the lack of major wealthy landowners and importance of agriculture in this landscape compared to the *Wooded Estate Downland* landscape; • The downs contain a well-established network of PRoW and a strong hierarchical network of roads; and • A landscape with a generally strong rural, secluded character, although with varying levels of movement across its extent.
A	D1a South Winchester Downland Mosaic (Enclosed) and D1b South Winchester Downland Mosaic (Open)	• Large scale rolling landform characteristic of the chalk dipslope, dissected by dry Valleys; • A prominent open ridge follows the line of the Meon anticline rising to 201m at Beacon Hill, from where there are panoramic views; • A large area of early assarted enclosures with thick hedgerows and large areas of woodland creates a small scale secluded landscape across the central part of the character area; • A strong pattern of woodland cover, including ancient woodland of national importance, wood pasture on Kilmeston Down, and hedgerows providing a sense of enclosure; • Occasional areas of unimproved chalk grassland and associated woody scrub, including juniper scrub which is of particular biodiversity interest; • Iron Age hillforts on the most prominent hills. Panoramic views from these hills have attracted the attention of visitors since the seventeenth century and inspired literary comment;

Section	Integrated character type/area	Key characteristics of relevance
		• Other historic monuments include an enclosure in Preshaw Woods and round barrow cemetery on Beacon Hill; • A number of minor designed landscapes at Longwood Park, Marwell House, Belmore House, Upham House, Preshaw House, Hazel Holt, Park House and Hill Place (all on Hampshire County Council's register); • The downs contain a well-established network of PRoW and a strong hierarchical network of roads; • A landscape with a generally strong rural, secluded character, although notable recreational uses include Marwell Zoological Park (a former medieval deer park) and a golf course on Corhampton Down; and • Panoramic views across downland, in particular from Beacon Hill across the Meon Valley to Winchester Hill.
A/B	D3a Bramdean and Cheriton Downland Mosaic (Enclosed)	• Comprises a gently undulating chalk downland landscape; • A number of ancient woodlands, the most extensive of which is Cheriton Wood; • Areas of more recent 18th and 19th century enclosure west of Cheriton Wood, at Old Down and north of Park Hill representing later enclosure of open common down. The battle of Cheriton, fought in 1644, occurred on open downland west of Cheriton Wood and the site remains as a registered battlefield; • The settlement pattern is characterised by farmsteads and hamlets (e.g. Kilmeston) dispersed across the downland, linked by a network of rural lanes; • Nucleated villages are located in the shelter of the Itchen Valley, e.g. Bramdean. The A272 utilises the valley as a communication route; • The downs contain a well-established network of PRoW, including the King's Way, Wayfarer's Walk, and the Itchen Way; • Areas of Registered Common Land at Cheriton and Bramdean provide open

Section	Integrated character type/area	Key characteristics of relevance
		public access as well as providing evidence of the former practice of grazing common wood pastures; • A number of minor parklands and designed landscapes at Hockley House, Brockwood Park, Hinton Ampner Park, Woodcote Park, Bereleigh House, and Bordean House with designed landscape features; and • Views across the Itchen and Meon Valleys.
B	Landscape Type C: Clay Plateau	• Large tracts of elevated gently undulating countryside; • A predominantly pastoral farmland landscape with significant blocks of woodland; • Varying enclosure - open and exposed in higher plateau areas with occasional long views, with a more enclosed landscape in relation to woodland cover; • Survival of original pre 1800 woodland and presence of oak as a key species in hedgerows and woodland; • Varied field pattern including irregular blocks of fields are evidence of 15th –17th century enclosure and a more regular field system represents 18th and 19th century enclosure; • Limited settlement comprising dispersed farmsteads and occasional small nucleated villages/hamlets with church spires forming distinctive landscape features; • Presence of round barrows indicative of a Bronze Age ritual landscape; • Narrow, little used lanes bordered by wide verges and ditches and limited rights of way network; • Small scale historic parkland landscapes, some relating to a history of hunting; and • A strong sense of remoteness, stillness and emptiness.

Section	Integrated character type/area	Key characteristics of relevance
B	C1 Froxfield Clay Plateau	• A landscape of mixed arable and pasture fields, some of late medieval origin (representing enclosure of the open fields around medieval settlements during the late medieval and post medieval periods) and some relating to planned enclosure during the 18th-19th centuries; • Varying enclosure - open and exposed in higher plateau areas (e.g. centrally around Colemore) with a more enclosed landscape in relation to woodland cover (e.g. in the north and south of the area); • Woodland occurs throughout the plateau – significant areas of ancient woodland occur in the northern part of the character area (e.g. Dogford Wood, Plash Wood and Lord's Wood) with small copses, sweet chestnut coppice and game coverts elsewhere. Presence of oak as a key species in hedgerows and woodland; • Coppiced hedgerows are characteristic with a high proportion of holly; • Low settlement density with isolated farmsteads of 18th-19th century origin set within areas of recent enclosure, and small nucleated villages of medieval origin (e.g. High Cross) lying within sheltered low-lying areas and surrounded by earlier enclosures. Some of the isolated farmsteads represent shrunken medieval hamlets; and • Narrow, little used rural lanes cross the area, bordered by wide verges and ditches. A marginal landscape with a strong sense of remoteness, stillness and emptiness.
B	D4a Newton Valence Downland Mosaic	• A gently rolling chalk landscape, eroded by dry valleys that form tributaries of the River Wey; • The majority of the landscape was enclosed during the 18th and 19th centuries giving rise to the planned landscape of fields of arable and pasture; • An area of small scale medieval assarts on the edge of Chawton represents late

Section	Integrated character type/area	Key characteristics of relevance
	(Enclosed)	medieval enclosure of open fields; • Areas of chalk grassland; • Remnants of three medieval deer parks (at Chawton, Newton Valence, and Farringdon) indicate the historic importance of the area for hunting; • The former house of Jane Austen, located in Chawton, is now a museum and is significant draw for tourists; • Nucleated villages are located in the shelter of lower lying areas, e.g. Lower Farringdon, Upper Farringdon and Chawton; A number of designed landscapes including Chawton House (listed on English Heritage's register), Newton Valence Place, Newton Valence Manor House, and Goleigh Manor (all on Hampshire County Council's register): • Remnants of three medieval deer parks (at Chawton, Newton Valence, and Farringdon) indicate the historic importance of the area for hunting; and • The former house of Jane Austen, located in Chawton, is now a museum and is a significant draw for tourists.

Designated Landscapes

Designations Relevant to Landscape

10.3.12 A summary of relevant designations and notable examples of high sensitivity and/or close to the route and Order Limits are presented in Table 10.4 and Figure 10.4.

Table 10.4: Relevant landscape designations

Designation or feature	Location or examples
South Downs National Park	At its southern extent, the route passes through approximately 20km of the SDNP between Bishops Waltham and Alton (Sections A and B). Some of the key sensitive features of the SDNP according to the SDNP Authority are tranquillity, dark skies, woodland and hedgerows, topography, watercourses and ponds, sunken or hedged lanes, ancient tracks and verges.
Local landscape designations	Woburn Hill and Chertsey Meads area of landscape importance, east of Chertsey (Section G).
Registered parks and gardens	• Bramdean House Grade II Registered Park and Garden, situated west of Bramdean approximately 1km west of the Order Limits (Section B); • Chawton House Grade II Registered Park and Garden, situated south of Alton and immediately north and west of the route (Section B); • Frimley Park Grade II Registered Park and Garden, situated within Frimley. (Section E); and • Woburn Farm Grade II Registered Park and Garden, situated south east of Chertsey and within 100m south east of the Order Limits (Section G).
Promoted gardens	• Hinton Ampner National Trust house and gardens, approximately 2km west of the Order Limits, west of Bramdean (Section A); and • Non designated but promoted landscape at Brockwood Park Krishnamurti Centre, south east of Bramdean (Section A).
Conservation areas	Conservation Areas are situated within the study area, such as Botley, Upper and Lower Froyle, Chawton, Upper and Lower Farringdon, Farnborough, Chertsey and Chobham. Please refer to Chapter 9 Historic Environment for further details.

Designation or feature	Location or examples
Listed buildings	Listed buildings are located within the study area, particularly within Conservation Areas but also throughout the rural landscape surrounding the route. Please refer to Chapter 9 Historic Environment for further details.
Scheduled Monuments	Scheduled Monuments are situated within the study area, such as Lomer deserted medieval settlement west of Warnford, earthworks across Chobham Common, Chertsey Bridge and Chertsey Abbey. Please refer to Chapter 9 Historic Environment for further details.
Ancient Woodland	Ancient Woodland is located throughout the study area, but is more extensive within the more rural southern section south west of Farnborough (Sections A, B, C and D). Notable examples in terms of proximity to the Order Limits include: • Woodland at Betty Mundy's Bottom (Section A); • Preshaw Wood and woodland on Preshaw Down, west of Warnford (Section A); • Riversdown Row and Blackhouse Row, south east of Kilmeston (Section A); • Hubbard's Copse and The Plantation, south and east of Bramdean Common (Section B); • Woodland east of Ropley (Section B); • Woodland east of Four Marks, in particular Ruddick's Copse, Southfield Copse and Hughes Copse (Section B); • Woodland south and east of Chawton, including Noar Copse, Comp, Holm Wood and Peckmead Copse (Section B); • Woodland at Neatham Down, east of Alton including Monk Wood (Section C); • Skains Copse, Combe Wood and Lawn Copse east of Crondall (Section D); • Saones Wood, Wood Copse and Greendane Copse south east of Church Crookham (Section D); • Woodland north of the B386 Longcross Road, west of Addlestone (Section F); and • Round Copse, south of Ashford and west of Queen Mary Reservoir (Section H).

Designation or feature	Location or examples
Tree Preservation Orders	The Order Limits would coincide with trees protected by Tree Preservation Orders (TPOs) in some locations. Key examples would include: • South of Church Crookham (Section D); • At Frimley (Section E); • Along Stonehill Road, west of Ottershaw (Section F); and • Along Longcross Road, west of Chertsey South (Section F).
Common Land	Several areas of registered Common Land are situated within the study area. Notable examples in terms of proximity to the Order Limits include: • Bramdean Common, north east of Bramdean (Section B); • Frimley Green and waste land adjoining the Hatches and Cross Lane (Section E); • West End Common, south of Lightwater (Section F); • Hookstone Green east of Lightwater (Section F); • Chobham Common (Section F); and • Stanner's Hill and land to north of Stanner's Hill east of Chobham (Section F).

Designation or feature	Location or examples
Open Access land	Areas of Open Access land, defined under the Countryside and Rights of Way Act 2000, either within the Order Limits or close by include: • Gallop at Stephen's Castle Down (Section A); • Beaconhill Beeches National Nature Reserve (Section A); • Bramdean Common, north east of Bramdean (Section B); • Land east of Fleet (labelled Cove Radio Station) (Section D); • Frimley Green and waste land adjoining the Hatches and Cross Lane (Section E); • The Maultway B3015 (Section F); • The Folly, Turf Hill, Brentmoor Heath and along Red Road B311 south east of Lightwater (Section F); and • Chobham Common (Section F).
Country Parks	Country Parks located either within the Order Limits or close by comprise: • Lightwater Country Park, west of Lightwater (Section F); and • Bedfont Lakes Country Park, Bedfont (Section H).
Green Belt and green space	The route runs through the Metropolitan Green Belt north east of Lightwater (within parts of Sections F, G and H), and areas of green space as identified within Local Plans are located throughout the study area. Whilst not strictly landscape designations, impacts on the openness of the Green Belt and defined green space is relevant to landscape.

Visibility

10.3.13 Understanding of visibility was informed by the Winter Landscape Survey, when visibility was most open prior to the leaves coming out on the trees.

Sections A - C

10.3.14 The landscape surrounding Sections A to C, including the chalk downland of the SDNP, is generally undulating. Surrounding the route, the landscape is often well wooded with a strong pattern of broadleaved woodland blocks, much of which is ancient, and tree belts.

10.3.15 Many views are restricted, including within the SDNP, by vegetation and the undulating landform. Views are often at close range and contained by landform so that only localised sections of the Order Limits would be visible.

10.3.16 There are some more expansive views from elevated areas surrounding Sections A - C, including within the SDNP. However, the undulating landform and intervening woodland cover would often fragment views, so that individual parts of the Order Limits would be visible rather than extensive lengths.

Sections D - H

10.3.17 High woodland cover, characteristic of the Thames Basin Heaths, surrounds a substantial proportion of Sections D, E and F of the route particularly between Crondall and Chertsey. The Hampshire Integrated Character Assessment and Surrey Landscape Character Assessment (refer to Table 10.2) describe the heavily wooded character and subsequent limited extent of views throughout this area.

10.3.18 The route runs through or next to extensive urban areas including Fleet, Church Crookham, Southwood, Farnborough, Frimley, Heatherside, Lightwater, Chertsey, Staines-Upon-Thames and Ashford. In some sections, the Order Limits run very close to the edges of the residential areas, such as the eastern edge of Heatherside and the southern edge of Lightwater.

10.3.19 However, views are tightly contained by dense woodland vegetation and built development throughout much of the northern half of the route, particularly in Sections D, E and F between Crondall and Chertsey. Mature vegetation belts on the edges of residential areas largely screen views from the properties towards the highway, even in winter. This vegetation would also screen many views towards the Order Limits.

10.3.20 In less well vegetated urban areas, there would be close range views towards the Order Limits so that very short parts would be visible. Examples include where the route would run along the highway through residential areas of Staines-Upon-Thames and Ashford. There would be a few more open views towards the Order Limits across pockets of landscape within generally well built up areas. Examples include views across golf courses, publicly accessible landscape west of Bingham Drive, Staines-Upon-Thames, views across Fordwich Park, Staines-Upon-Thames, and across the landscape at Dumsey Meadow and Chertsey Meads. Wider views

towards the Order Limits would also be possible from some open areas of heathland landscape at Chobham Common in Section F where public access is permitted.

Visual Receptors

10.3.21 Table 10.5 identifies key potential visual receptors. The list of visual receptors identified is not exhaustive, but identifies some of the key visual receptors that will be used to select representative viewpoints from.

Table 10.5: Key potential visual receptors

Receptor group	Examples
Residents	People living on edges of settlements closest to the Order Limits. Key surrounding settlements include: • Botley (Section A); • Boorley Green (Section A); • Bishops Waltham and Newtown (Section A); • West Tisted (Section B); • Four Marks (Section B); • Chawton (Section B); • Alton (Section C); • Upper Froyle and Lower Froyle (Section C); • Bentley (Section C); • Crondall (Section D); • Church Crookham (Section D); • Farnborough (Section E); • Frimley, Heatherside (Camberley) and Lightwater (Sections E and F); • Chobham and Burrowhill (Section F); • Chertsey and Addlestone (Section G); and • Staines-Upon-Thames and Ashford (Section H).
People visiting the SDNP	• Users of PRoW including the South Downs Way National Trail, open access land, and common land; and • People visiting key attractions and tourist sites within the SDNP, such as Beacon Beeches National Nature Reserve, Hinton Ampner National Trust house and gardens, and Brockwood Park Krishnamurti Centre (Section A).
People using Public Rights of	A strong network of PRoW runs throughout the study area, and PRoW run close to and cross the Order Limits. Several promoted PRoW would be crossed by, or run close to, the Order Limits including The South Downs Way

Receptor group	Examples
Way	(Section A) and Thames Path (Section G) National Trails and the following long distance paths: • Pilgrim's Trail (Section A); • Monarch's Way (Section A); • Wayfarer's Walk (Section A); • St Swithun's Way (Section B); • Hangers Way (Section C); and • Blackwater Valley Path (Section E).
People visiting historic parks and gardens and promoted gardens	• Hinton Ampner National Trust house and gardens (Section A); • Brockwood Park Krishnamurti Centre (Section A); • Chawton House Grade II Registered Park and Garden (Section B); • Frimley Park Grade II Registered Park and Garden (Section E); and • Woburn Farm Grade II Registered Park and Garden (Section G).
People using publicly accessible landscapes	Visual receptors within publicly accessible landscapes. Notable examples include: • Promoted gardens – refer to Table 10.4; • Common Land – refer to Table 10.4; • Open Access land – refer to Table 10.4; • Country Parks – refer to Table 10.4; • Other parks and recreational areas. Notable examples include: • Playing field east of Fleet (Section D); • Playing fields east of Southwood (Section E); • Queen Elizabeth Park at Farnborough (Section E); • Playing fields south of Windlemere Golf Club, east of Lightwater (Section F); • Playing fields north of Abbey Moor Golf Course, Addlestone and south of Chertsey (Section G); • Chertsey Meads children's play and picnic areas (Section G); • Publicly accessible field west of Bingham Drive, Staines-Upon-Thames (Section H); and • Fordbridge Park, Staines-Upon-Thames (Section H).

Receptor group	Examples
	• Sites promoted for wildlife (see details in also Chapter 7 Biodiversity). Notable examples include: • Beacon Beeches NNR (Section A); • Bourley and Long Valley SSSI, Church Crookham (Section D); • Eelmoor Marsh SSSI, Southwood (Section D); • Brentmoor Heath LNR and Colony Bog and Bagshot Heath at West End, Surrey Heath (Section F); • Chobham Common NNR and SSSI, Chobham (Section F); • Chertsey Meads LNR (Section G); • Dumsey Meadow SSSI, Chertsey (Section G); and • Bedfont Lakes LNR (Section H).
People using private landscapes	Users of golf courses • Four Marks Golf Club, east of Four Marks (Section B); • Worldham Park Golf Club, west of East Worldham (Section C); • Oak Park Golf Club, east of Crondall (Section D); • Southwood Golf Course at Southwood (Section E); • Pine Ridge Golf Club at Camberley (Section E); • Windlemere Golf Club east of Lightwater (Section F); • Queenswood Golf Course west of Ottershaw (Section F); • Foxhills Golf Club, north west of Ottershaw (Section F); and • Abbey Moor Golf Course, Addlestone (Section G). School playing fields at the following establishments: • Farnborough Hill School, Farnborough (Section E); • Frimley C of E School, Frimley (Section E); • Salesian School, Chertsey (Section F); • Philip Southcote School and nearby school, Addlestone (Section G); • Buckland Infant and Junior Schools and The Matthew Arnold School, Staines-Upon-Thames (Section H); and

Receptor group	Examples
	• St James' Senior Boys School, Ashford (Section H). Other: • Cemetery at Addlestone Moor, south of Chertsey (Section G); and • Ashford Cemetery, Ashford (Section H).

10.4 Likely Significant Effects

Sensitivity of Landscape and Visual Receptors

10.4.1 To consider the potentially significant effects, the sensitivity of landscape and visual receptors has been established in accordance with the Impact Assessment Methodology Tables 10.9 and 10.12.

Landscape Receptors

10.4.2 Landscape effects will be assessed against landscape character and landscape designations which have been explored within Section 10.3 Baseline Conditions.

10.4.3 Landscape effects will be assessed against the national character areas identified within Table 10.1 and the South Downs integrated character areas identified within Table 10.3. The characteristics defined within the county landscape character areas (Table 10.2) have been used to help identify representative viewpoints and to inform the sensitivity of the national and South Downs character areas. Further information on the choice of published landscape character areas to base the assessment of landscape effects against is set out in Section 10.5.

10.4.4 The landscape sensitivity of the national character areas is set out in Table 10.6. The assessment of landscape sensitivity is based on the criteria set out in Table 10.9.

Table 10.6 Landscape sensitivity of national character areas

National character area	Landscape Sensitivity	Justification
128: South Hampshire Lowlands	High	• The landscape is particularly distinctive and cannot readily accommodate the types of change resulting from the Project without harm. However, effects would largely be of a temporary nature; • The landscape forms part of the highly valued and nationally recognised SDNP; • Outside the SDNP, the landscape forms the immediate landscape setting to the SDNP; and • Cultural heritage associations include Ancient Woodland which forms a legacy of the Forest of Bere.
125: South Downs	High	• The landscape is particularly distinctive and cannot readily accommodate the types of change resulting from the Project without harm. However, effects would largely be of a temporary nature; • Much of the landscape forms part of the highly valued and nationally recognised SDNP; • The landscape offers high recreational value which is promoted by the SDNP Authority; • The landscape is in consistently good condition and provides a high level of scenic value; and • The landscape has strong cultural heritage associations with its pattern of Ancient Woodland, designated heritage features and historical landscape features identified within the Historic Landscape Characterisation Report, South Downs National Park (Wyvern Heritage and Landscape, 2017).
130: Hampshire Downs	High	• The landscape is particularly distinctive and cannot readily accommodate the types of change resulting from the Project without harm. However, effects would largely be of a temporary nature; • Forms part of the highly valued and nationally recognised SDNP; • The landscape offers high recreational value which is promoted by the SDNP Authority; • The landscape is in consistently good condition and provides a high level of scenic value; and

National character area	Landscape Sensitivity	Justification
		• The landscape has strong cultural heritage associations with its pattern of ancient woodland, designated heritage features and historical landscape features identified within The Historic Landscape Characterisation Report, South Downs National Park (Wyvern Heritage and Landscape, 2017).
120: Wealden Greensand	High	• The landscape is particularly distinctive and cannot readily accommodate the types of change resulting from the Project without harm. However, effects would largely be of a temporary nature; • Forms part of the highly valued and nationally recognised SDNP; • The landscape offers high recreational value which is promoted by the SDNP Authority; • The landscape is in consistently good condition and provides a high level of scenic value; and • The landscape has strong cultural heritage associations with its pattern of Ancient Woodland, designated heritage features and historical landscape features identified within the Historic Landscape Characterisation Report, South Downs National Park (Wyvern Heritage and Landscape, 2017).
129: Thames Basin Heaths	Medium	• The landscape character is distinctive, but has some ability to accommodate the types of change resulting from the Project with limited harm; • Includes locally designated areas of landscape importance; • Recreational value provided by public accessibility within Common Land such as Chobham Common; • Landscape in moderate physical condition with scenic quality provided by the heavily wooded character; and • Historic commons and Ancient Woodland provide strong cultural heritage associations

National character area	Landscape Sensitivity	Justification
115: Thames Valley	Medium	• The landscape character is distinctive, but has some ability to accommodate the types of change resulting from the Project with limited harm; • Includes locally designated areas of landscape importance; • Recreational value provided by public parks and landscapes within the urban setting such as Chertsey Meads along the River Thames; and • due to public accessibility, the existence of some locally distributed promotional (tourist) material and/or local groups indicate a degree of interest in the area.

10.4.5 The South Downs integrated landscape character areas identified within Table 10.3 are all of high sensitivity because:

- The landscape is particularly distinctive and cannot readily accommodate the types of change resulting from the Project without harm. However, effects would largely be of a temporary nature;
- The landscape forms part of the highly valued and nationally recognised SDNP;
- The landscape offers high recreational value which is promoted by the SDNP Authority;
- The landscape is in consistently good condition and provides a high level of scenic value; and
- The landscape has strong cultural heritage associations with its pattern of ancient woodland, designated heritage features and historical landscape features identified within The Historic Landscape Characterisation Report, South Downs National Park (Wyvern Heritage and Landscape, 2017).

10.4.6 The sensitivity of landscape designations and features identified in Table 10.4 is defined in Table 10.7. The assessment of landscape sensitivity is based on the criteria set out in Table 10.9.

Visual Receptors

10.4.7 The sensitivity of visual receptor groups identified in Table 10.5 is presented in Table 10.8. This is based on the criteria set out in Table 10.11.

Table 10.7 Landscape sensitivity of landscape designations or features

Designation or feature	Landscape Sensitivity	Justification
South Downs National Park	High	• The landscape is particularly distinctive and cannot readily accommodate the types of change resulting from the Project without harm. However, effects would largely be of a temporary nature; • The landscape forms part of the highly valued and nationally recognised SDNP; • The landscape offers high recreational value which is promoted by the SDNP Authority; • The landscape is in consistently good condition and provides a high level of scenic value; and • The landscape has strong cultural heritage associations with its pattern of Ancient Woodland, designated heritage features and historical landscape features identified within the Historic Landscape Characterisation Report, South Downs National Park (Wyvern Heritage and Landscape, 2017).
Local landscape designations: Woburn Hill and Chertsey Meads area of landscape importance	Medium	• The landscape is distinctive, but has some ability to accommodate the types of change resulting from the Project with limited harm; • The landscape is locally designated and valued; • Recreational value – Chertsey Meads promoted for recreational access with car parks and picnic areas; and • Scenic quality, particularly valued as green space within a generally well built up area.
Registered Parks and Gardens	High	• The landscape is particularly distinctive and cannot readily accommodate the types of change resulting from the Project without harm. However, effects would largely be of a temporary nature; • Highly valued and designated heritage asset; and • Strong cultural heritage associations.

Designation or feature	Landscape Sensitivity	Justification
Promoted gardens: Hinton Ampner house and gardens (National Trust)	High	• Has some ability to accommodate the types of change resulting from the Project with limited harm because of distance from the route; • High recreational value due to public accessibility, the existence of widely distributed promotional (tourist) material; • The landscape is in consistently good condition and provides a high level of scenic quality. • A rare landscape which includes internationally or nationally unique landscape elements/features. • Strong cultural heritage associations of more than local significance.
Promoted gardens: Non designated but promoted landscape at Brockwood Park Krishnamurti Centre	Medium	• The landscape character/feature, while distinctive, has some ability to accommodate the types of change resulting from the Project with limited harm; • Landscape includes regionally or locally unique landscape elements/features within the arboretum; and • Some locally distributed promotional (tourist) material and/or local groups indicate a degree of interest in this landscape.
Conservation Areas	High	• Particularly distinctive and cannot readily accommodate the types of change resulting from the Project without harm. However, effects would largely be of a temporary nature; • Highly valued and designated heritage asset; and • Strong cultural heritage associations.

Designation or feature	Landscape Sensitivity	Justification
Listed buildings	High	• Particularly distinctive and cannot readily accommodate the types of change resulting from the Project without harm. However, effects would largely be of a temporary nature; • Highly valued and designated heritage asset; and • Strong cultural heritage associations.
Scheduled Monuments	High	• Particularly distinctive and cannot readily accommodate the types of change resulting from the Project without harm. However, effects would largely be of a temporary nature; • Highly valued and designated heritage asset; and • Strong cultural heritage associations.
Ancient Woodland and Tree Preservation Orders	High	• Particularly distinctive and cannot readily accommodate the types of change resulting from the Project without harm; • Highly valued; • Provides scenic quality; and • Strong cultural heritage associations.
Common Land and Open Access land	Medium	• The landscape has some ability to accommodate the types of change resulting from the Project with limited harm; and • High recreational value due to public accessibility.
Country Parks	Medium	• Has some ability to accommodate the types of change resulting from the Project with limited harm because of distance from the route; and • High recreational value due to public accessibility.

Designation or feature	Landscape Sensitivity	Justification
Green Belt and green space as identified within Local Plans	Medium	• Has some ability to accommodate the types of change resulting from the Project with limited harm because designation relates to retaining openness. Designation is not based on landscape distinctiveness or sensitivity; and • Recreational value coincides with areas defined as Green Belt and green space because they typically lack high density development.

Table 10.8 Sensitivity of Visual Receptors

Receptor group	Sensitivity	Justification
Residents	High	• Residents in their homes are classed as being highly sensitive.
People visiting the SDNP	High	• Visual receptors experiencing cherished views of historic and/or cultural importance at a national level and which are highly susceptible to change. • Users of PRoW including users of South Downs Way. • Users of recreational facilities where the purpose of that recreation is enjoyment of the landscape (e.g. Public Parks, National Trust/English Heritage properties or estates and other areas of high heritage value).
People using Public Rights of Way	High	• Users of PRoW including promoted National Trails and long distance routes are classed as being highly sensitive.
People visiting registered parks and gardens and promoted gardens	High	• Users of recreational facilities where the purpose of that recreation is enjoyment of the landscape (e.g. public parks, National Trust/English Heritage properties or estates and other areas of high heritage value) are classed as being highly sensitive.
People using publicly accessible landscapes	High	
People using private landscapes	Medium	• Schools and other institutional buildings, and their outdoor areas and users of recreational facilities where there is incidental enjoyment of the landscape (e.g. golfers) are classed as being of medium sensitivity.

Construction Effects

10.4.8 During the temporary construction period, potential landscape and visual effects could be caused by:

- Movement of construction plant and vehicle deliveries;
- Contractors' compounds;
- Vehicle haul routes;
- Stockpiled soil and materials;
- Presence of temporary fencing;
- Loss of vegetation; and
- Marks across the landscape following topsoil strip and surface reinstatement.

The construction phase would largely be of short duration. Loss of vegetation could have longer term implications. However, the design and construction methods aim to avoid loss of vegetation.

10.4.9 The construction phase would largely be of short duration (see Chapter 3 Description of the Development for typical rates of working within rural and urban areas).

10.4.10 However, there may be potential for post construction landscape and visual effects caused by loss of vegetation. This would have longer term implications because reinstatement and mitigation planting could take up to 15 years to fully establish. Ancient Woodland is considered irreplaceable, so any loss would cause a permanent effect.

There may be potential for landscape and visual effects arising from loss of vegetation for a period of up to 15 years post construction.

10.4.11 Loss of vegetation, including that of status, would largely be avoided (see Chapter 4 Design Evolution for embedded mitigation). Other appropriate measures to mitigate the landscape and visual impacts of construction on the landscape, including the design, specification and monitoring of all reinstatement and mitigation planting, will be included in the Register of Environmental Actions and Commitments (REAC) as set out in Chapter 4 Design Evolution.

10.4.12 The following text considers the potential effects that could be caused by construction and that could remain for up to 15 years post construction.

Effects on Landscape Character

10.4.13 It is not possible to identify with any certainty whether effects on the landscape character areas identified for assessment (refer to Tables 10.1 and 10.3) would be significant or not at this stage. This is because the extent of vegetation removal is not yet known, and vegetation loss could cause a primary impact on landscape character during construction and for a period of time post construction before replacement planting has become established.

10.4.14 However, there could be potential adverse effects on landscape character which could be significant in places. These would mostly relate to areas of extensive loss of vegetation or where the vegetation is of high status, and in areas of high sensitivity including:

- within the SDNP;
- within locally designated landscapes; and
- within the setting of designated historic features that are close by, such as Chawton House and Farnborough Hill Conservation Area. For more information on these historic features, please refer to Chapter 9 Historic Environment.

There could be potential adverse effects on landscape character which could be significant in places. These would mostly relate to areas of extensive loss of vegetation or where removed vegetation is of high status, and in areas of high sensitivity. This is scoped in.

10.4.15 The assessment of effects on landscape character would be considered along the extent of the route and associated Order Limits. This is because there is not enough information about vegetation loss to refine the scope of assessment at this scoping stage. It is also usual practice to consider effects on landscape character for the extent of a project, and we anticipate this approach would be expected by stakeholders. Consideration of effects on landscape character are therefore scoped in for further assessment.

Effects on Landscape Designations

10.4.16 Potential effects on the landscape designations identified within Table 10.4 are described below.

SDNP

10.4.17 Loss of vegetation could potentially cause partial loss or noticeable damage to the landscape. This could cause impacts of significance both during construction and for a period of time post construction before replacement planting has become established. The SDNP Authority has also raised concerns about potential effects on tranquillity, dark skies, woodland and hedgerows, topography, watercourses and ponds, sunken or hedged lanes, ancient tracks and verges. Therefore, further assessment of impacts has been scoped into the assessment.

Within the SDNP and Woburn Hill and Chertsey Meads area of landscape importance, loss of vegetation could potentially cause partial loss or noticeable damage to the landscape. This is scoped in.

Local landscape designations (Woburn Hill and Chertsey Meads area of landscape importance)

10.4.18 Loss of vegetation could potentially cause partial loss or noticeable damage to the landscape. This could cause impacts of significance both during

construction and for a period of time post construction before replacement planting has become established. Therefore, further assessment of impacts has been scoped into the assessment.

Registered Parks and Gardens

10.4.19 Loss of vegetation could potentially cause partial loss or noticeable damage to the landscape setting of Chawton House and Woburn Farm Registered Parks and Gardens because they are close to the Order Limits. This could cause impacts of significance both during construction and for a period of time post construction before replacement planting has become established. Therefore, further assessment of impacts on the landscape setting of Chawton House and Woburn Farm has been scoped into the assessment.

Loss of vegetation could potentially cause partial loss or noticeable damage to the landscape setting of two of the registered parks and gardens identified within the study area. This is scoped in.

10.4.20 Bramdean House Grade II Registered Park and Garden is located on the edge of the study area, approximately 1km west of the Order Limits. The landscape setting of the park and garden primarily comprises the settlement of Bramdean, which would screen views between the designated park and garden and the route.

10.4.21 Frimley Park Grade II Registered Park and Garden is approximately 900m west of the Order Limits. The landscape setting of the park and garden comprises built development within Frimley, and Frimley Park Hospital. Intervening development would screen views between the designated park and garden and the Order Limits.

10.4.22 The route would not run through or affect the landscape setting of Bramdean House or Frimley Park Registered Park and Garden. Assessment of impacts on the landscape setting has been scoped out from further assessment because there is no impact pathway between the Project and Registered Park and Garden (Planning Inspectorate Advice Note 7 question 1).

It is very unlikely that the Project would cause any effects of significance on the landscape setting of Hinton Ampner because of the distance between the asset and the Order Limits. This is scoped out. Brockwood Park is in close proximity to the Order Limits, and therefore there could be potential impacts to the wider setting of the park. This is scoped in.

Promoted Gardens: Hinton Ampner National Trust House and Gardens and Brockwood Park Krishnamurti Centre

10.4.23 Undulating rural landscape with frequent woodland blocks provides the landscape setting to Hinton Ampner house and gardens. Intervening topography and woodland would restrict long distance

views of approximately 2km between the house and gardens and the Order Limits. Whilst the Project would cross farmland owned by the National Trust, this is not considered part of the landscape setting of the house and gardens because it is approximately 2km to the east. It is very unlikely that the Project would cause any effects of significance on the landscape setting of Hinton Ampner either during construction or post construction because of the distance between the asset and the Order Limits. Assessment of impacts on the landscape setting has been scoped out from further assessment because potential impacts are unlikely to be significant (Planning Inspectorate Advice Note 7 question 3). However, visual effects would still potentially apply.

10.4.24 Brockwood Park Krishnamurti Centre is set within a well-treed, parkland landscape, surrounded by woodland blocks at Godwin's Plantation, Humpty's Down and Moon's Copse. The Order Limits run approximately 200m to the west of the park, through its wider landscape setting. There could potentially be some views between the Order Limits and the park. Given the close proximity, and the potential impacts to the wider setting of the park, further assessment of impacts has been scoped into the assessment.

Conservation Areas, listed buildings and Scheduled Monuments

10.4.25 The extent of landscape setting surrounding heritage assets varies depending on the surrounding context and the extent of visibility to and from the asset. The landscape setting of some heritage assets is limited by surrounding built development and vegetation. In more open areas, the landscape setting is larger.

10.4.26 It is unlikely that there would be effects of significance on the landscape setting of all of the heritage assets within the study area. In some cases, there would be no impact pathway between the Project and the landscape setting of the Scheduled Monument (Planning Inspectorate Advice Note 7 question 1). In other cases, potential impacts are unlikely to be significant (Planning Inspectorate Advice Note 7 question 3).

There could be potential effects of significance on the landscape setting of some heritage assets. This would be where assets are close to the Order Limits and where the landscape setting would be directly affected by vegetation loss. See Table 10.13 for scoping summary.

10.4.27 However, there could be potential effects of significance on the landscape setting of some heritage assets, both during construction and for a period of time post construction before replacement planting has become established. This would be where assets are close to, or within, the Order Limits and where the landscape setting would be directly affected by vegetation loss. Therefore, further assessment of impacts on the landscape setting of Conservation Areas, Grade I and II* listed buildings and Scheduled Monuments has been scoped into the assessment.

10.4.28 It would not be proportional to the nature of the Project and the likely effects (mainly temporary), to consider the effects on Grade II listed buildings throughout the entire study area. The landscape setting of Grade II listed buildings and features is commonly geographically restricted to the immediate surroundings. It is very unlikely that effects on the landscape setting of Grade II listed buildings in excess of 300m from the Order Limits would be significant. Therefore, effects on the landscape setting of Grade II listed buildings would be restricted to those within 300m of the Project (Planning Inspectorate Advice Note 7 question 2).

Ancient Woodland and TPOs

There could be potential effects of significance on TPOs and Ancient Woodland within close proximity to the Order Limits. See Table 10.13 for scoping summary.

10.4.29 The design and construction methods aim to avoid loss of vegetation of high status. Care has been taken to avoid the Order Limits encroaching on any existing classified Ancient Woodland, and wherever practicable guidelines for working near trees contained within NJUG Volume 4 will be implemented along with protective measures specified in BS5837:2012, Trees in relation to design, demolition and construction – Recommendations, in order to safeguard trees (see Chapter 4). However, the extent of vegetation loss is unknown at this stage and arboricultural surveys have yet to be undertaken. Ancient Woodland is considered irreplaceable. Trees, groups of trees and woodlands are protected by Tree Preservation Orders (TPOs) by local planning authorities in the interests of amenity. Trees within Conservation Areas are similarly protected and valued. Any loss of such woodland or trees would cause permanent impacts which could potentially be significant.

10.4.30 The roots and canopies of some protected trees could potentially fall within the Order Limits even where the trunks grow outside the Order Limits. As mentioned above, wherever practicable guidelines for working near trees contained within NJUG Volume 4 will be implemented along with protective measures specified in BS5837:2012, Trees in relation to design, demolition and construction – Recommendations, to safeguard trees (see Chapter 4), but a precautionary approach has been taken in this scoping assessment with regard to potential landscape effects from these trees being affected. Further assessment of the landscape impacts on TPOs and areas of Ancient Woodland within 15m of the Order Limits has therefore been scoped into the assessment. A buffer of 15m beyond the Order Limits has been applied, to ensure consideration of all protected trees that could potentially be affected in accordance with British Standard 5837:2012 Trees in relation to design, demolition and construction – Recommendations. This includes the following areas of Ancient Woodland:

- Woodland at Betty Mundy's Bottom (Section A);
- Hughes Copse, West of Lower Farringdon (Section B);

- Noar Copse and Comp, Holm Wood, Broadlands Row, north of Upper Farringdon (Section B);
- Skains Copse, Ewshot (Section D);
- Greendane Copse, Church Crookham (Section D);
- Woodland north of the B386 Longcross Road, west of Addlestone (Section F); and
- Round Copse, south of Ashford and west of Queen Mary Reservoir (Section H).

10.4.31 Assessment of the landscape impacts relating to TPOs and existing classified Ancient Woodland beyond 15m of the Order Limits has been scoped out, because there would be no damage to the roots and branches of trees beyond this distance in accordance with British Standard 5837:2012 Trees in relation to design, demolition and construction – Recommendations. Therefore, there would be no impact pathway between the Project and trees of status over 15m from the Order Limits (Planning Inspectorate Advice Note 7 question 1).

Common Land and Open Access land

10.4.32 Landscape impacts on Common Land and Open Access land would be restricted to those areas that would be severed by the route. Loss of vegetation could potentially cause partial loss or noticeable damage to the landscape. This could cause impacts of significance both during construction and for a period of time post construction before replacement planting has become established.

Landscape impacts on Common Land and Open Access land would be restricted to those areas that would be severed by the route. See Table 10.13 for scoping summary.

10.4.33 Areas of registered Common Land that would be directly affected are:

- Frimley Green and waste land adjoining the Hatches and Cross Lane (Section E); and
- Chobham Common (Section F).

10.4.34 Areas of open access land that would be directly affected are:

- Frimley Green and waste land adjoining the Hatches and Cross Lane (Section E);
- The Maultway B3015 (Section F);
- Along Red Road B311, south east of Lightwater (Section F); and
- Chobham Common (Section F).

10.4.35 Areas of Common Land and Open Access land within the study area that would not be physically affected by the Project are scoped out of further assessment. This is because there is no impact pathway between the Project and these receptors (Planning Inspectorate Advice Note 7 question 1). However, visual effects would still potentially apply.

Country Parks

10.4.36 There would be no direct landscape impacts on Lightwater or Bedfont Lakes Country Parks because they would not be physically affected by the Project. Assessment of landscape impacts on Country Parks has been scoped out of further assessment. This is because there is no impact pathway between the Project and these receptors (Planning Inspectorate Advice Note 7 question 1). However, visual effects would still potentially apply.

There would be no direct landscape impacts on Lightwater or Bedfont Lakes Country Parks because they would not be physically affected by the Project. This is scoped out.

Green Belt and green space as identified within Local Plans

10.4.37 Impacts on the openness of the Green Belt and green space as identified within Local Plans would largely be of a temporary nature. Remaining above ground structures would be limited in size and number, and would not significantly affect the openness of the Green Belt or other green spaces. Assessment of impacts on Green Belt and green space as identified within Local Plans has been scoped out of further assessment. This is because their openness is not sensitive to the impacts concerned (Planning Inspectorate Advice Note 7 question 2). However, visual effects would still potentially apply.

Impacts on the openness of the green belt and open space as identified within Local Plans would largely be of a temporary nature. This is scoped out.

Visual Effects

10.4.38 It is not possible to identify with any certainty whether visual effects would be significant or not at this stage. This is because the extent of vegetation removal is not yet known. Vegetation loss could cause a primary impact on views during both construction and for a period of time post construction until any replacement planting becomes established. The text below provides a summary of the potentially significant visual effects.

10.4.39 Surrounding the southern half of the route, within Sections A-C, significant visual effects may be possible from sensitive viewpoints in close proximity to

Significant visual effects would be possible from residential properties close to the route and sections of Public Right of Way that are in close proximity to, or cross, the route. This is scoped in.

the Order Limits. In particular, significant visual effects may be possible from residential properties close to the Order Limits and sections of Public Right of Way that are in close proximity to, or cross, the Order Limits. This could include a section of the South Downs Way National Trail and parts of other promoted long distance paths as shown on Figure 10.4. There could also be potential visual effects of significance from long distance, high viewpoints within the SDNP.

10.4.40 Surrounding the northern half of the route (within Sections D-H), significant visual effects may be possible from nearby viewpoints of medium to high sensitivity, particularly from areas of public landscape. These could include:

- public parks and areas of Common Land (e.g. Chobham Common); and
- golf courses and PRoW crossing or next to the Order Limits.

10.4.41 Visual effects could also potentially be significant for residential properties where views towards the Order Limits would be less constrained, including:

- the eastern and south eastern edge of Upper Froyle;
- the southern and eastern residential edge of Crondall; and
- residential properties closest to the route south of Church Crookham.

10.4.42 It is not feasible to scope out visual receptors in the absence of a zone of theoretical visibility (ZTV) and without details of vegetation loss. However, the scope of the visual assessment is provisionally framed based on the selection of representative viewpoints identified within Appendix 3 Survey Methodology Report, Table 3.1.

Operational Effects

10.4.43 Landscape and visual effects during operation would not be significant. This is because the pipeline structures would be mainly underground, and because permanent above ground features would be limited and small in size (see Chapter 3 Description of the Development). Further assessment of operational effects has been scoped out from further assessment because they are unlikely to be significant (Planning Inspectorate Advice Note 7 question 3).

Landscape and visual effects during operation would not be significant because the pipeline structures would be mainly underground, and because permanent above ground features would be limited and small in size This is scoped out.

10.5 Impact Assessment Methodology

Scope of Landscape and Visual Impact Assessment

10.5.1 The landscape and visual impact assessment would be based on GLVIA3. The scope of the landscape and visual impact assessment would be largely defined by the approach to the assessment. GLVIA3 promotes landscape and visual impact assessment that is proportional to the scale and nature of the proposals and the likely landscape and visual effects.

10.5.2 The largely temporary nature of the construction phase means that that likely landscape and visual effects of significance would be limited. Landscape and visual effects and mitigation proposals would be very similar across broad areas of landscape, and for groups of visual receptors with the same sensitivity (such as users of PRoW and residents in properties within similar locations).

The largely temporary nature of the construction phase means that likely landscape and visual effects of significance would be limited.

10.5.3 It is not therefore considered proportionate or beneficial to carry out an exhaustive study including effects on detailed landscape character areas and all visual receptors that would be affected. The following scope of the landscape and visual impact assessment identifies a proportionate approach. This would focus on identifying the key and most significant landscape and visual effects and appropriate landscape mitigation.

10.5.4 The assessment would consider landscape and visual effects during construction, and post construction in winter year 1 and summer year 15. Assessment at winter year 1 would identify the effects when mitigation planting would be ineffective. Assessment at summer year 15 would identify the effects when any mitigation planting would have established. This will demonstrate the benefits of any proposed mitigation planting and how the landscape and visual effects would decrease over time.

10.5.5 The likelihood of longer term landscape and visual effects (summer year 15) of significance would be limited once mitigation planting had established and any marks upon the landscape had reduced. However, longer term landscape and visual effects will be considered to demonstrate the effectiveness of proposed landscape reinstatement mitigation. This approach is in accordance with GLVIA3. It is also likely that stakeholders would prefer to see how the landscape mitigation would reduce the significance of effects in the longer term.

The likelihood of longer term landscape and visual effects of significance would be limited once mitigation planting had established and any marks upon the landscape had reduced.

Decommissioning

10.5.6 Decommissioning activities would be subject to an appropriate decommissioning strategy, as per Chapter 3 Description of the Development. It is not practical to assess the effects of decommissioning at this stage as the methodology and likely good practice mitigation measures will not be defined until closer to the time, at least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

Study Area

10.5.7 The study area for the landscape and visual impact assessment would be 1km from the proposed Order Limits. Whilst there may be longer distance views towards temporary construction activity and areas of vegetation loss post construction (until any replacement planting establishes), it is unlikely that visual effects would be significant. This is because of the largely temporary nature of construction effects and/or the distance.

10.5.8 There may, however, be some exceptions to this from high points including within the SDNP. This concern was raised by the SDNP Authority (in discussions which informed this Scoping Report), and it was agreed that a selection of representative longer distance viewpoints in excess of 1km would be included within the assessment. Representative viewpoints would be selected from a ZTV, which would be generated up to 5km from the proposed Order Limits to show the extent of views towards the construction activity.

Consultation

10.5.9 The scope of the LVIA and the location of representative viewpoints would be agreed where possible through ongoing consultation and engagement with local planning authorities. Within the highly sensitive SDNP, the detailed route alignment and landscape reinstatement mitigation would be developed through further ongoing consultation with the SDNP Authority.

Assessment of Landscape Effects

Landscape Character

10.5.10 The published national character areas (see Table 10.1) would be used as the baseline against which to assess landscape effects. Within the SDNP, landscape effects would also be assessed against the published SDNP Integrated Landscape Character Areas (see Table 10.3). The Historic Landscape Characterisation Report, South Downs National Park (Wyvern Heritage and Landscape, 2017) would be used to further develop the detailed baseline understanding of the landscape character. This approach would be proportional to the scale and nature of the Project and the likely effects which would largely be temporary.

Published national character areas would be used as the baseline against which to assess landscape effects.

Within the SDNP, landscape effects would also be assessed against the published SDNP Integrated Landscape Character Areas.

10.5.11 It would not be proportionate to base the assessment of landscape effects on published county scale landscape character areas or landscape character assessments of any greater detail. However, these more detailed assessments have been used to select initial representative viewpoints in Appendix 3 Survey Methodology Report, Table 3.1. They will also be used to further inform the assessment of sensitivity of the landscape (see Table 10.6) and the landscape mitigation.

10.5.12 Vegetation forms part of the landscape character, and loss of vegetation would contribute to the overall magnitude of landscape impact (refer to Table 10.10) on each landscape character area assessed. Loss of vegetation would be included in the assessment of effects on landscape character. Impacts on trees would be informed by an arboricultural assessment (refer to Arboricultural Methodology in paragraph 10.5.31).

Landscape Designations

10.5.13 An assessment of effects on the landscape designations and features scoped in within Section 10.4, likely significant effects, will be carried out. In summary landscape designations and features scoped into the assessment of landscape effects are:

- The SDNP, including consideration of effects on tranquillity, dark skies, woodland and hedgerows, topography, watercourses and ponds, sunken or hedged lanes, ancient tracks and verges;
- Local landscape designations (Woburn Hill and Chertsey Meads area of landscape importance);
- Chawton House and Woburn Farm Registered Parks and Gardens;

- Scheduled Monuments;
- Conservation Areas;
- Grade I and II* listed buildings;
- Grade II listed buildings within 300m of the Order Limits;
- Promoted Gardens: Brockwood Park Krishnamurti Centre;
- Ancient Woodland and TPOs within 15m of the Order Limits; and
- Common Land and Open Access land that would be severed by the route.

10.5.14 Compliance with landscape planning policy would be considered.

10.5.15 The sensitivity of the landscape receptors would be reviewed based on further development of the baseline information, fieldwork and consultation responses on the Scoping Report.

10.5.16 Sensitivity relates to the ability of the landscape receptors to accommodate the types of change resulting from the Project without large changes in the baseline situation (also referred to as its 'susceptibility'). Sensitivity also includes the relative value that is attached to that landscape receptor by society. This takes into account any national or local designations and factors such as recreational value, the physical state or condition of the landscape, its scenic quality, its rarity and any specific cultural heritage associations. The landscape receptors include the landscape character and any features that are particularly important in defining landscape character (see Section 10.3). The criteria that would be used in determining landscape sensitivity are defined in Table 10.9.

Table 10.9: Table of criteria for landscape sensitivity

Landscape sensitivity	Criteria description
High	• The landscape character/feature is particularly distinctive and cannot readily accommodate the types of change resulting from the Project without harm. • The landscape is highly valued and includes international or national designations such as World Heritage Sites, National Parks, Areas of Outstanding Natural Beauty, Conservation Areas, Listed Buildings or Scheduled Monuments. • High recreational value due to public accessibility, the existence of widely distributed promotional (tourist) material and/or local groups indicate a high level of interest in the area. • The landscape is in consistently good condition and provides a high level of scenic quality. • A rare landscape which includes internationally or nationally unique landscape elements/features. • Strong cultural heritage associations of more than local significance.
Medium	• The landscape character/feature, while distinctive, has some ability to accommodate the types of change resulting from the Project with limited harm. • The landscape is moderately valued and may include local designations. • Recreational value due to public accessibility, the existence of some locally distributed promotional (tourist) material and/or local groups indicate a degree of interest in the area. • The landscape is in moderate physical condition with some degree of scenic quality or in a condition that could be readily improved, with greater scenic quality, without excessive capital investment. • A landscape which includes regionally or locally unique landscape elements/features. • Strong cultural heritage associations, but of primarily local significance.
Low	• The landscape character/feature is not distinctive and can readily accommodate the types of change resulting from the Project without harm. • The landscape contains no designations. • There is little recreational value, very limited public access and no obvious local interest in the area. • The majority of the landscape is in poor/derelict condition with little scenic merit. It could not be improved without extensive capital investment.

Landscape sensitivity	Criteria description
	• The landscape is not remarkable or unique in any way. • Few cultural heritage assets.

10.5.17 To predict landscape effects the baseline information would be combined with details of the Project. The effects on the landscape receptors, both during and post construction, would be described and whether effects are beneficial or adverse recorded. Post construction effects would be considered in year 1 following scheme construction and in year 15 when any landscape mitigation planting would be fully established.

10.5.18 The significance of the landscape effects is a function of the sensitivity of the landscape receptor likely to be affected (as described above), and the magnitude of the change likely to occur. The magnitude of change includes the size and extent of the change brought about by the Project. This is both in terms of existing landscape character and landscape elements/features and the addition of new landscape elements/features. Descriptions of the criteria that would be applied in considering the magnitude of change are given in Table 10.10.

10.5.19 The sensitivity of the landscape receptors and the magnitude of landscape change are combined to allow a final judgement to be made about whether each effect is significant or not. In simple terms where the receptor has a high level of sensitivity and undergoes a major magnitude of change, the overall significance of effect is likely to be of a high order. Equally, where the receptor has a low level of sensitivity and undergoes a more minor magnitude of change, the overall significance of effect is likely to be of a lower order.

Table 10.10: Table of magnitude of landscape impact

Magnitude of landscape impact	Typical criteria descriptors
Large adverse	Total loss or large scale damage to existing landscape character and/or distinctive landscape elements/features, and/or the addition of new but uncharacteristic and conspicuous landscape elements/features, and/or impact of long duration (over 15 years) or irreversible.
Medium adverse	Partial loss or noticeable damage to existing landscape character or distinctive landscape elements/features, and/or the addition of new but uncharacteristic and noticeable landscape elements/features, and/or impact of medium duration or reversible within the medium term (five to 15 years).
Small adverse	Slight loss or damage to existing landscape character or landscape elements/features, and/or the addition of new but uncharacteristic and small landscape elements/features, and/or impact of short duration (0 – five years).
Negligible adverse	Barely noticeable loss or damage to existing landscape character or landscape elements/features, and/or the addition of new but uncharacteristic and very small landscape elements/features.
No change	No noticeable loss, damage/improvement or alteration to landscape character or any landscape elements/features.
Negligible beneficial	Barely noticeable improvement of landscape character by the restoration of existing landscape elements/features, and/or the removal of uncharacteristic and very small landscape elements/features or addition of new very small characteristic landscape elements/features.
Small beneficial	Slight improvement of landscape character by the restoration of existing landscape elements/features, and/or the removal of uncharacteristic and small landscape elements/features or addition of new characteristic small landscape elements/features, and/or impact of short duration (0 – five years).
Medium beneficial	Partial or noticeable improvement of landscape character by the restoration of existing landscape elements/features, and/or the removal of uncharacteristic and noticeable landscape elements/features, or addition of new characteristic landscape elements/features, and/or impact of medium duration or reversible within the medium term (five to 15 years).

Magnitude of landscape impact	Typical criteria descriptors
Large beneficial	Large scale improvement of landscape character by the restoration of landscape elements/features, and/or the removal of uncharacteristic and conspicuous landscape elements/features, or addition of new distinctive potentially 'iconic' landscape features, and/or impact of long duration (over 15 years) or irreversible.

Assessment of Visual Effects

10.5.20 To ensure a proportionate assessment, visual effects would be assessed from a range of representative viewpoints in accordance with GLVIA3. A selection of initial publicly accessible viewpoints has been identified throughout the study area (see Appendix 3 Scoping Survey Methodology Report, Table 3.1).

A range of representative viewpoints would be assessed. Viewpoint locations would be agreed where possible with the SDNP Authority and landscape officers at local planning authorities.

10.5.21 Representative viewpoints have been selected to show the most significant visual effects because of their:

- high sensitivity (see Table 10.11);
- closeness to the proposals (in particular to construction compounds); and
- the likely change in existing view.

10.5.22 The locations have been selected from the baseline assessment of key potential visual receptors (Table 10.5), references to views made within published literature, the findings of the Winter Landscape Survey and professional judgement.

10.5.23 The number and location of representative viewpoints are subject to change. It was not possible to generate a ZTV prior to the selection of initial representative viewpoints, so the locations will be reviewed in the context of the ZTV once it is available, and the developing design.

10.5.24 Agreement of representative viewpoints will be sought through engagement with the SDNP Authority and landscape officers at local planning authorities within administrative areas that would be crossed by the replacement pipeline route.

10.5.25 The location of representative viewpoints is shown on Figure 10.4 and listed in Appendix 3 Scoping Survey Methodology Report, Table 3.1.

10.5.26 Visual effects would be assessed from the representative viewpoints identified and agreed where possible with local planning authorities. The sensitivity of the visual receptor is related to the ability of the view to accommodate change without consequences to its scenic quality, the circumstances in which the visual receptor is experiencing the view and the value attached (Table 10.11).

Table 10.11: Criteria for sensitivity of visual receptors

Visual receptor sensitivity	Criteria description
High	• Visual receptors experiencing cherished views of historic and/or cultural importance at a national or regional level and which are highly susceptible to change. • Residents in their homes. • Users of PRoW or other recreational trails (e.g. National Trails, footpaths, bridleways etc.). • Users of recreational facilities where the purpose of that recreation is enjoyment of the landscape (e.g. Public Parks, National Trust/English Heritage properties or estates and other areas of high heritage value).
Medium	• Visual receptors experiencing cherished views of historic and/or cultural importance at a local level and which are moderately susceptible to change. • Outdoor workers. • Users of scenic roads, railways or waterways or users of designated tourist routes. • Schools and other institutional buildings, and their outdoor areas and users of recreational facilities where there is incidental enjoyment of the landscape (e.g. golfers).
Low	• Visual receptors experiencing views of little historic and/or cultural importance which are not very susceptible to change. • Indoor workers. • Users of main roads (e.g. trunk roads) or passengers in public transport on main arterial routes. • Users of recreational facilities where the purpose of that recreation is not related to the view (e.g. sports facilities).

10.5.27 The existing views from the representative viewpoints would be described. The magnitude of visual change would be assessed in accordance with Table 10.12.

10.5.28 The magnitude of visual change would be assessed by the potential size and extent of the change in the view. The change in the view relates to the loss or addition of features, and the proportion of the view occupied by the Project. The distance of the receptor from the Project would influence these aspects. The degree of contrast or integration with the character of the landscape would be important. Also the nature of the view in terms of the relative amount of time over which it would be experienced.

10.5.29 The change in view both during and after construction would be described. Whether impacts are beneficial or adverse would be recorded based on whether the changes affect the quality of the views. Post construction effects would be considered in year 1 following scheme construction and in year 15 when landscape mitigation planting would be fully established. Descriptions of the criteria applied in considering the magnitude of visual impact are given in Table 10.12.The significance of the visual effects identified would depend on the sensitivity of the viewer likely to be affected and the magnitude of the change in the view experienced by the receptor.

10.5.30 The sensitivity of the visual receptors and the magnitude of the visual effects would be combined. In simple terms where the visual receptor has a high level of sensitivity and the view they experience undergoes a large magnitude of change, the overall significance of effect would be of a high order. Conversely where the visual receptor has a low level of sensitivity and the view they experience undergoes a small magnitude of change, the overall significance of effect would be of a low order.

Table 10.12: Criteria for magnitude of visual impact

Magnitude of visual impact	Typical criteria descriptors
Large adverse	• The Project would immediately dominate the view and completely degrade its overall character and scenic quality; • The Project would completely screen/conflict with existing attractive and highly cherished features in the view; • The deterioration in the existing view would be experienced by a large number of people over an extensive area; and/or • Impact of long duration (over 15 years) or irreversible.
Medium adverse	• The Project would form a visible and recognisable new element of the view and partially degrade its overall character and scenic quality; • The Project would partly screen/conflict with existing attractive features in the view; • The deterioration in the view would be experienced by a moderate number of people over a wide area; and/or • Impact of medium duration (five to 15 years) or reversible within the medium term.
Small adverse	• The Project would constitute a minor component of the wider view and slightly degrade its overall character and scenic quality; • The Project would slightly screen/conflict with existing features in the view; • The Project would cause a slight deterioration in the view experienced by few people over a limited area; and/or • Impact of short duration (0 to five years).
Negligible adverse	• Only a very small part of the Project would be visible resulting in a barely noticeable deterioration in the existing view; and/or • The deterioration in the view would be experienced by very few people over a limited area.
No change	• No part of the Project, or work or activity associated with it, is discernible by anyone.
Negligible beneficial	• Only a very small part of the Project would be visible resulting in a barely noticeable improvement in the existing view; and/or • The improvement in the view would be experienced by very few people over a limited area.

Magnitude of visual impact	Typical criteria descriptors
Small beneficial	• The Project would be a minor part of the wider view and slightly improve its overall character and scenic quality; • The Project would slightly screen existing unsightly features in the view or open up new views; • The Project would cause minor improvements to the existing view experienced by few people over a limited area; and/or • Impact of short duration (0 to five years).
Medium beneficial	• The Project would constitute a component of the wider view and improve its overall character and scenic quality; • The Project would screen existing unsightly features in the view or open up new views; • The improvement in the view would be experienced by a moderate number of people over a wide area; and/or • Impact of medium duration or reversible within the medium term (five to 15 years).
Large beneficial	• The Project would greatly enhance overall character and scenic quality; • The Project would open up attractive and highly cherished features in the view; • The improvement in the existing view would be experienced by a large number of people over an extensive area; and/or • Impact of long duration (over 15 years) or irreversible.

Arboricultural Assessment Methodology

10.5.31 The British Standard 5837:2012 Trees in relation to design, demolition and construction – Recommendations sets out the need to assess the effects of a development on trees. A targeted approach to the tree survey will be undertaken by arboriculturists in order to record information about notable trees within 15m of the Order Limits (see Appendix 3 Survey Methodology Report, Section 4). By providing tree constraints information the results of the arboricultural survey will be used along with other baseline data to inform design options and the landscape and visual impact assessment.

10.6 Summary Scope for the EIA

10.6.1 Table 10.13 summarises the scope of the landscape and visual impact assessment.

Table 10.13: Matters of significance for landscape and visual effects

Receptor	Matter / potential effects	Location within 1km study area	Comments
National character areas and SDNP Integrated Landscape Character Areas	Landscape effects	Refer to Figure 10.1 and 10.3	Scoped in. Provides an assessment of landscape effects proportional to the scale and nature of the Project and the likely effects, which would largely be of a temporary nature. Assessment would allow development of landscape reinstatement mitigation.
SDNP	Landscape effects	Southern end of route between Bishops Waltham and Alton. Refer to Figure 10.4	Scoped in. Highly sensitive and nationally recognised landscape which would be directly affected by the Project. Loss of vegetation could potentially cause partial loss or noticeable damage to the landscape. This could cause impacts of significance both during construction and for a period of time post construction before replacement planting has become established.
Local landscape designations	Landscape effects	Runnymede Area of Landscape Importance, east of Chertsey. Refer to Figure 10.4	Scoped in. Locally valued landscape which would be directly affected by the Project. Loss of vegetation could potentially cause partial loss or noticeable damage to the landscape. This could cause impacts of significance both during construction and for a period of time post construction before replacement planting has become established.
Heritage features	Effects on landscape setting	Chawton House and Woburn Farm Registered Parks and Gardens Scheduled Monuments	Scoped in. Loss of vegetation could potentially cause partial loss or noticeable damage to the landscape setting of Chawton House and Woburn Farm registered historic parks and gardens. This could cause impacts of significance both during construction and for a period of time post construction before

Receptor	Matter / potential effects	Location within 1km study area	Comments
		Conservation Areas Grade I and II* listed buildings Grade II listed buildings within 300m of the Order Limits Refer to Figure 10.4	replacement planting has become established.
Heritage features	Effects on landscape setting	Frimley Park and Bramdean House Registered Parks and Gardens Refer to Figure 10.4	Scoped out. The Order Limits route would not run through or affect the landscape setting of Bramdean House or Frimley Park Registered Parks and Garden. Assessment of impacts on the landscape setting has been scoped out from further assessment because there is no impact pathway between the Project and receptors.
Heritage features	Effects on the landscape setting	Grade II listed buildings over 300m from the Order Limits Refer to Figure 10.4	Scoped out. The landscape setting of Grade II listed buildings and features is commonly geographically restricted to the immediate surroundings. It is very unlikely that effects on the landscape setting of Grade II listed buildings in excess of 300m from the Order Limits would be significant. Therefore, effects on the landscape setting of Grade II listed buildings would be restricted to those within 300m of the Project

Receptor	Matter / potential effects	Location within 1km study area	Comments
Promoted gardens and their landscape setting	Landscape effects and effects on the landscape setting	Hinton Ampner National Trust house and gardens, approximately 2km west of the Order Limits , west of Bramdean	Scoped out. Intervening topography and woodland would restrict long distance views of approximately 2km between the designated house and gardens and the Order Limits. It is very unlikely that the Project would cause any effects of significance on the landscape setting of Hinton Ampner because of the distance. Assessment of impacts on the landscape setting has been scoped out from further assessment because potential impacts are unlikely to be significant. However, visual effects would still potentially apply.
		Promoted landscape at Brockwood Park Krishnamurti Centre	Scoped in. The Order Limits runs approximately 200m to the west of the park, through its wider landscape setting. There could potentially be some views between the Order Limits and the park. Given the close proximity to the Order Limits, and the potential impacts to the wider setting of the park, further assessment of impacts has been scoped into the assessment.
Ancient Woodland and TPOs within 15m of the Order Limits	Landscape effects	Ancient Woodland at: • Woodland at Betty Mundy's Bottom; • Hughes Copse, West of Lower Farringdon; • Noar Copse and Comp, Holm Wood, Broadlands Row, north of Upper Farringdon;	Scoped in. The design and construction methods aim to avoid loss of vegetation of high status. However, the extent of vegetation loss is unknown at this stage and arboricultural surveys have yet to be undertaken. Any loss of Ancient Woodland or protected trees would cause permanent landscape impacts. The roots and canopies of some protected trees are likely to fall within the Order Limits even where the trunks grow outside the Order Limits. These trees could potentially be affected.

Receptor	Matter / potential effects	Location within 1km study area	Comments
		• Skains Copse, Ewshot; • Greendane Copse, Church Crookham; • Woodland north of the B386 Longcross Road, west of Addlestone; and • Round Copse, south of Ashford and west of Queen Mary Reservoir. Refer to Figure 10.4	
Ancient Woodland and TPOs beyond 15m of the Order Limits	Landscape effects	Refer to Figure 10.4	Scoped out. Landscape impacts on TPOs and Ancient Woodland beyond 15m of the Order Limits has been scoped out, because there would be no damage to the roots and branches of trees beyond this distance. Therefore, there would be no impact pathway between the Project and trees of status over 15m from the Order Limits.

Receptor	Matter / potential effects	Location within 1km study area	Comments
Registered Common Land and Open Access land	Landscape effects	Areas of registered common land that would be directly affected are: • Frimley Green and waste land adjoining the Hatches and Cross Lane (Section E); and • Chobham Common (Section F). Areas of Open Access land that would be directly affected are: • Frimley Green and waste land adjoining the Hatches and Cross Lane (Section E); • The Maultway B3015 (Section F); • Along Red Road B311, south east of Lightwater (Section F); and • Chobham Common	Scoped in. Landscape impacts on Common Land and Open Access land would be restricted to those areas that would be severed by the route. Loss of vegetation could potentially cause partial loss or noticeable damage to the landscape. This could cause impacts of significance both during construction and for a period of time post construction before replacement planting has become established.

Receptor	Matter / potential effects	Location within 1km study area	Comments
		(Section F); Refer to Figure 10.4.	
Registered common land and open access land	Landscape effects	Areas of Common Land and Open Access land within the study area that would not be physically affected by the Project Refer to Figure 10.4	Scoped out. This is because there is no impact pathway between the Project and receptors. However, visual effects would still potentially apply.
Lightwater or Bedfont Lakes Country Park	Landscape effects	Lightwater Country Park, located north west of Lightwater and Bedfont Lakes Country Park, located north east of Ashford Refer to Figure 10.4	Scoped out. Assessment of landscape impacts on Country Parks has been scoped out of further assessment. This is because there is no impact pathway between the Project and receptors, as they would not be physically affected. However, visual effects would still potentially apply.
'Openness' of Green Belt and other identified green spaces	Landscape effects	Refer to Figure 10.4	Scoped out. Remaining above ground structures would be limited in size and number, and would not significantly affect the openness of these receptors. Assessment of landscape impacts on has been scoped out of further assessment. This is because the openness of the receptors is not sensitive to the impacts concerned. However, visual effects would still potentially apply.

Receptor	Matter / potential effects	Location within 1km study area	Comments
Representative viewpoints	Discussions and agreement with LPAs	Identified in Appendix 3 Scoping Survey Methodology Report, Table 3.1, and illustrated on Figure 10.4	Scoped in. Provides an assessment of visual effects proportional to the scale and nature of the Project and the likely effects.
Landscape and visual receptors	Operational landscape and visual effects	Scheme wide	Scoped out. Landscape and visual effects during operation would not be significant. This is because the pipeline structures would be mainly underground, and because permanent above ground features would be limited and small in size (see Chapter 3 Description of the Development).

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Chapter 11
Soils and Geology

Scoping Report Volume 1

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11. Soils and Geology

11.1 Introduction

11.1.1 Soils and geology are key factors in determining the environmental character and quality of any given location or area. The rocks and superficial deposits beneath the ground's surface have a major influence on the landform – i.e. the topography and other geographical features of an area. The physical and chemical properties of the rocks and the overlying soils influence the type and variety of vegetation that will grow, agricultural quality, drainage, flood risk and water storage capacity. They also influence the transfer and distribution of contaminants arising from current and previous land use.

11.1.2 The quality of the land may be affected by contamination as a result of previous or current potentially contaminative land uses. These include for example industrial uses and landfilling of waste. Receptors include:

- people (both on-site such as construction workers and site users, and off-site including residents);
- infrastructure;
- controlled waters (groundwater and surface water); and
- ecological receptors.

11.1.3 These may be affected if contamination is present and there is a viable pollutant pathway linking the contaminant to the receptor. This chapter considers the potential implications of the existing land quality on the construction and operation phases of the Project. It also covers the potential impacts of the Project on land quality.

11.1.4 The aspects considered in this Soils and Geology chapter include soils, geology, minerals, and land contamination.

11.1.5 Soils aspects include:

- impacts on agricultural soil; and
- impacts on sensitive and vulnerable soils.

11.1.6 Geology aspects include:

- impact on designated areas of geological interest;
- unstable natural ground; and
- suitability for trenchless construction.

11.1.7 Minerals aspects include:

- the presence of mineral safeguarding areas and minerals allocations and consents.

11.1.8 Land contamination aspects include:

- the presence of known or suspected potentially contaminated material associated with active and closed landfills. Also other potentially contaminative past activities.

11.1.9 Hydrogeology (including aquifers), water quality and human health aspects are only considered here where they may be the receptor to a potential pollutant linkage where the source is land contamination. Other aspects of hydrogeology and water

quality are considered in the Water chapter (Chapter 8). Other aspects of human health are considered in the Health Impact chapter (Chapter 14).

11.1.10 Ecological aspects including geology and hydrogeology dependent ecosystems are considered in the Biodiversity chapter (Chapter 7). However, where such systems or the underlying geology may be affected by contamination that will be included here.

11.1.11 Agricultural aspects other than those detailed above are considered in the Land Use chapter (Chapter 12).

11.1.12 Waste aspects other than the presence of existing and historic landfills are considered in the Land Use chapter (Chapter 12) and in Appendix 7 (Technical Note on Waste and Materials).

11.1.13 Aspects associated with potential contamination from the operation of the pipeline are covered in Chapter 15 Major Accidents.

11.1.14 Chapter 11 was written by a technical expert in the fields of Geology and Land Contamination currently employed by Jacobs. She has over 23 years' experience in the consultancy sector and 7 years in research and development. Her qualifications are BSc Honours Geology and PhD in Applied Geochemistry. She is a Fellow of the Geological Society and has been a Chartered Geologist since 1999.

11.2 Key Legislation, Policy and Guidance

11.2.1 The following legislation, policy and guidance has been used to inform the soils and geology scoping study. It also assisted in the identification of likely significant effects and mitigation.

Legislation

Environmental Protection Act (1990)

11.2.2 Part 2A of the Environmental Protection Act (EPA) 1990 and associated Statutory Guidance (Department for Environment Food & Rural Affairs (DEFRA) (2012)) is the primary legislation on contaminated land. It provides a framework for the assessment and, where necessary, the remediation of contaminated land. It is designed to operate to make land suitable for its existing use, with "change of use" being more properly dealt with under the planning regime, where it underpins NPPF paragraph 121.

Environmental Damage (Prevention and Remediation) Regulations (2015)

11.2.3 The Environmental Damage (Prevention and Remediation) Regulations 2015 (EDR) aim to prevent new land contamination that will damage water or health.

Environmental Permitting (England and Wales) Regulations (2016)

11.2.4 The Environmental Permitting (England and Wales) Regulations 2016 include transposition of the EU Landfill Directive (LFD) into UK law.

Landfill Directive

11.2.5 The Landfill Directive was adopted by the European Community (EC) in 1999. Every Member State of the European Union (EU) was required to implement it from 16 July 2001. The Directive's overall objective is to prevent or reduce as far as possible the negative effects of landfilling on the environment, as well as any resulting risk to human health. It seeks to achieve this through specifying uniform technical standards at Community level. It also sets out requirements for the location, management, engineering, closure and monitoring for landfills. The Directive includes requirements relating to the characteristics of the waste to be landfilled. The Landfill Directive is currently implemented through the Environmental Permitting (England and Wales) Regulations 2016.

Town and Country Planning (Development Management Procedure (England) Order) (DMPO) (2015)

11.2.6 Schedule 4(y) of the DMPO requires that planning authorities must consult Natural England on development proposals affecting more than 20 hectares of best and most versatile (BMV) agricultural land (see Section 11.3 for a definition of BMV). Although not applicable to the Planning Act 2008 regime, this legislation gives some status and protection for BMV land in the planning system.

Policy

Overarching National Policy Statement for Energy (EN-1)

11.2.7 EN-1, in paragraphs 5.3, 5.10.8, 5.10.9, states that development should aim to avoid significant harm to geological conservation interests and identify mitigation where possible. It also states that the impacts to BMV land should be minimised and applicants should ensure that they have considered the risk posed by land

contamination. Applicants should safeguard any mineral resources as far as possible, taking into account the long-term potential of the land use.

National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)

11.2.8 EN-4 states that applicants should understand the soil types and the nature of the underlying strata. This is because underground cavities and unstable ground conditions may present risks. Impacts could also include loss of use of minerals underneath the pipeline (sterilisation) or loss of soil quality.

11.2.9 Whilst EN-1 and EN-4 remain the prime decision making documents, where they do not provide guidance, the following may also be considered important and relevant guidance that may require consideration by the decision making authority. At this stage it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State and it is included for completeness to allow the Secretary of State to make such a determination. In considering these policies it should be noted that the Local Authorities and SDNPA are not the decision maker for the Project.

National Planning Policy Framework

11.2.10 The National Planning Policy Framework (paragraphs 109, 111, 112, 113, 117, 120, 121, 142 - 146) relates to conserving and enhancing the natural environment, and helping the sustainable use of minerals, and provides further detail than is included in EN-4. Paragraph 144 includes that planning policy should '*not normally permit other development proposals in mineral safeguarding areas where they might constrain potential future use for these purposes*'. Paragraph 121 provides guidance on land contamination which is not included in EN-4, including that planning decisions should ensure that the site is suitable for its new use taking into account ground conditions and previous use, and following development the land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990.

National Planning Policy for Waste

11.2.11 National Planning Policy for Waste (paragraph 5), relates to the physical and environmental constraints on waste management facilities from proposed development.

Guidance and Advice Notes

11.2.12 The following UK government web pages provide guidance on matters covered in this chapter:

- https://www.gov.uk/contaminated-land: Guidance on management of land affected by contamination (no publication date). Including Contaminated Land Report (CLR) 11: Model Procedures for the Management of Land Contamination, Environment Agency (2004) - primary guidance used for contaminated land assessment.
- https://www.gov.uk/guidance/minerals: Guidance on the planning for mineral extraction in plan making and the application process (published October 2014).
- https://www.gov.uk/government/publications/agricultural-land-assess-proposals-for-development/guide-to-assessing-development-proposals-on-agricultural-

land#use-alc-to-support-your-planning-decisions: Guide to assessing development proposals on agricultural land (published January 2018).

- https://www.gov.uk/guidance/natural-environment#brownfield-land-soils-and-agricultural-land

11.2.13 Regulator guidance considered in this chapter includes:

- The Environment Agency's Approach to Groundwater Protection (November 2017, Version 1.1) - Section J (Land Contamination) and Policy Position J4 (Working with planning authorities and local communities).
- The Environment Agency's Guiding Principles for Managing and Reducing Land Contamination (GPLC2; last updated April 2016).

11.2.14 Industry Codes of Practice:

- CL:AIRE definition of waste: development industry code of practice - provides a voluntary framework for determining whether or not excavated soil materials used in land development and remediation projects are waste.
- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (2009).

Local and Mineral Plans

11.2.15 Each of the district and borough local authorities have a Local Plan, each at various stages of adoption and review (see Appendix 2). Many of the local plans include specific policies with regard to land contamination. While each is different, they are all in accordance with the NPPF and require the potential for land contamination to be considered in planning applications and development proposals.

11.2.16 Each of the Mineral Planning Authorities (Surrey County Council and Hampshire County Council) have developed Minerals and Waste Plans, as listed in Appendix 2.

11.3 Baseline Conditions

Soil

Study Area

11.3.1 The study area for soil comprises the area directly affected by the Project, the Order Limits as shown on Figure 3.1. Figures 11.1, 11.2 and 11.3 also show soil information for land up to within a 2km buffer of the Order Limits to provide context within which to assess the information.

Data Sources

11.3.2 Soil data availability is shown on the Soilscapes Viewer developed by Cranfield University (http://www.landis.org.uk/soilscapes/) and the metadata was purchased from the Cranfield Soil and Agrifood Institute (supported by DEFRA). More generalised soil information was downloaded from the UK Soil Observatory (UKSO) map viewer (http://mapapps2.bgs.ac.uk/ukso/home.html) developed by the BGS.

11.3.3 Agricultural Land Classification (ALC) metadata were downloaded from Natural England Open Data (http://naturalengland-defra.opendata.arcgis.com/). ALC provides a method for assessing the quality of farmland. This aids decision making on the appropriate future development of land. The ALC system classifies land into five grades, from 1 to 5, and has additional classifications of “Non Agricultural’ and ‘Urban’.

11.3.4 The BMV agricultural land is graded 1 to 3a. The ALC grades, as defined in Technical Report 11 by the Ministry of Agriculture, Fisheries and Food (MAFF 1988), are listed in Table 11.1.

Table 11.1 ALC Grades

ALC Grade	MAFF Definition
Grade 1	Excellent quality agricultural land
Grade 2	Very good quality agricultural land
Grade 3a	Good quality agricultural land
Grade 3b	Moderate quality agricultural land
Grade 4	Poor quality agricultural land
Grade 5	Very poor quality agricultural land

11.3.5 The national ALC mapping does not give a difference between Grade 3a and Grade 3b land. Where other data are not available it must be assumed that the land is Grade 3a (and therefore BMV).

11.3.6 Some additional ALC mapping has been obtained in the form of the Post 1988 ALC site survey data. Where Grade 3 is mapped this includes the subdivision of Grade 3 into subgrades 3a and 3b. In the study area, Post 1988 ALC mapping is only available for small areas of land near Four Marks (Section B), south of Crondall (Section C), and near Laleham (Section H).

11.3.7 Soil may also be an important factor in sites designated for biodiversity and priority habitats. This is described in Chapter 7 Biodiversity.

Soil Baseline Description

11.3.8 The soil types present in the study area are presented in Table 11.2. Their locations are shown on Figure 11.1. These comprise a range of soil types from stony deep sandy soils to peat. Table 11.2 summarises the area of each soil unit mapped within the Order Limits, and the relative percentages of each soil type present. This shows the predominant soils are loamy soils, and deep sandy soils and the area of soil mapped as peat is relatively small.

Table 11.2 Soil types in the study area

Soil unit name and simple description	Area within Order Limits (ha)	Simplified soil Type	% of Order Limits
634 - SOUTHAMPTON - stony deep sandy	22.5	Stony Deep Sandy	4.23%
554a - FRILFORD - deep sandy	1.6	Deep Sandy	24.2%
643a - HOLIDAYS HILL - deep sandy to clay	117.1		
342a - UPTON 1 - shallow silty over chalk	1.6	Shallow Silty	14.07%
343h - ANDOVER 1 - shallow silty over chalk	30.2		
511f - COOMBE 1 - silty over chalk	32.1		
571m - CHARITY 2 - deep silty to clay	12.0	Deep Silty	13.55%
571z - HAMBLE 2 - deep silty	1.1		
581d - CARSTENS - deep silty to clay	48.5		
511d - BLEWBURY- clayey over chalk	6.4	Clayey	1.41%
712c - WINDSOR - seasonally wet deep clay	6.3	Deep Clay	4.09%
813d - FLADBURY 3 - seasonally wet deep clay	4.2		
814a - THAMES - seasonally wet deep clay	8.1		
841c - SWANWICK - seasonally wet deep loam	37.6	Loam	37.22%

Soil unit name and simple description	Area within Order Limits (ha)	Simplified soil Type	% of Order Limits
571i - HARWELL - loam over sandstone	13.2		
571w - HUCKLESBROOK - deep loam	63.7		
572j - BURLESDON - deep loam	17.9		
711g - WICKHAM 3 - seasonally wet loam to	32.7		
711h - WICKHAM 4 - seasonally wet loam to	7.9		
1024b - ADVENTURERS' 2 - peat	5.7	Peat	1.25%

11.3.9 Soils around Boorley Green in the southern part of Section A comprise mainly loamy soils, with deep clay soils present west of Bishop's Waltham. The rest of Section A and the majority of Sections B and C comprise deep or shallow silty soils. Loamy soils are locally present in these sections for example north of Lower Farringdon and north-east of Alton, and clayey soils are locally present east of Chawton.

11.3.10 Soils in Section D and E comprise a mixture of loamy soils and deep sandy soils, with deep clay also present associated with the Blackwater Valley near Frimley. Stony deep sandy soils are present around Bisley. The majority of soils mapped in Section F comprise loamy soils and deep sandy soils, but the mapping shows peat ("fen peat over glaciofluvial drift Tertiary and Cretaceous sand") is locally present within the study area between Lightwater and Chobham (Section F).

11.3.11 North of the M25, in Sections G and H, soils are predominantly loamy, and there are also areas of deep clay soils associated with the River Thames.

11.3.12 The ALC for the study area is presented in Table 11.3 and shown in Figures 11.2 and 11.3 (post 1988 ALC). There are no land areas in the study area which fall within ALC Grade 5.

Table 11.3 ALC Grades for the study area

ALC grade	Pre-1988 ALC data only (Ha)	Combined pre- and post-1988 ALC data (Ha)	Area of combined data as % of total study area
Grade 1	12.3	10.0	2.2%
Grade 2	34.6	36.9	8.1%
Grade 3 (undifferentiated)	155.8	148.8	32.5%
Grade 3a	n/a	2.9	0.6%
Grade 3b	n/a	5.7	1.2%
Grade 4	44.1	44.1	9.6%
Non Agricultural	159.0	156.5	34.2%

Urban	51.5	51.5	11.3%
Post 1988 other	n/a	0.9	0.2%

11.3.13 The majority of the study area is of ALC Grade 3 land and non-agricultural land use with only small areas of ALC Grade 1 and 2 land. There are three small areas of ALC Grade 1 land in the study area: east of Boorley Green (Section A), and south of West Bedfont and east of Penton Hook (both Section H). The wider mapping shows ALC Grade 1 land is also locally present east of the Order Limits in Sections G and H.

11.3.14 ALC Grade 2 land is present in the study area north of Bishop's Waltham and north-east of Boorley Green (both within Section A), east of Chawton (Section B), between Bentley and Holybourne (Section C) and then east and north-east of Penton Hook (Section H).

11.3.15 The Post-1988 ALC data also shows ALC Grade 3 land north of Monkwood (Section B) has been reclassified as a mixture of Grade 3a, Grade 3b and 'other' (non-agricultural) land, and a small area of ALC Grade 3 land south of Crondall (Section C) has been reclassified as Grade 2.

11.3.16 The Post-1988 ALC data (Figure 11.3) shows that the area of ALC Grade 1 land east of Penton Hook (Section H) has been reclassified as either Grade 2 or 3a and that a portion of ALC Grade 2 land has been reclassified as either Grade 3a or 3b. Some of the non-agricultural land has been reclassified as Grade 2, 3a or 3b.

11.3.17 Designated biodiversity sites and priority habitats with potentially sensitive soils within the study area are detailed in Chapter 7. These include Thursley, Ash, Pirbright & Chobham SAC, woodland soils, wet woodland, grazing marsh, chalk grassland and lowland meadow.

Soil Aspects Value / Sensitivity

11.3.18 The value or sensitivity of soil receptors has been assessed in Table 11.4 below.

Table 11.4 Criteria for determining the value/sensitivity of soil receptors

Receptor	Value / sensitivity	Rationale for value / sensitivity
ALC Grade 1	High	Best and most versatile land and limited resource in area
ALC Grade 2	High	Best and most versatile land and limited resource in area
ALC Grade 3	Medium	Includes both Grade 3a (best and most versatile land) and Grade 3b (not BMV) but widespread
ALC Grades 4, 5, Urban and Non-Agricultural	Negligible	Not best and most versatile land.
Peat soils (Landis natmap code 1024b)	High	Potentially very sensitive to disturbance, more difficult to restore.

Receptor	Value / sensitivity	Rationale for value / sensitivity
Other Soilscape Categories	Negligible	Not particularly sensitive to disturbance.
Soils associated with ecological receptors	N/A	Not assessed here as considered in Chapter 7.

Geology

Study Area

11.3.15 The study area for geology comprises the Order Limits as shown in Figure 3.1. Geological mapping of the wider area has been reviewed to inform our understanding of the geological context. Figure 8.2 is based on the BGS 1:50,000 bedrock geological mapping and Figure 8.3 on the BGS 1:50,000 superficial geological mapping.

Data Sources

11.3.16 All 1:10,000 scale metadata were taken from BGS Digital Data under Licence from Groundsure Ltd and were used to determine the baseline conditions. These consisted of; Bedrock Geology; Superficial Deposits; Linear Features; Artificial Ground; Mass Movement. The study area between Lower Farringdon and Frimley has no coverage of 1:10,000 scale geology. The 1:50,000 scale Aquifer Potential and Permeability metadata were also taken from this source.

11.3.17 All 1:50,000 scale metadata were taken from BGS Web Map Services (WMS). These are Bedrock Geology, Superficial Deposits, Linear Features, Artificial Ground, Mass Movement, Geosure Landslides, Geosure Soluble Rocks, British Karst Database. The 1:25,000 scale Landslides metadata were also taken from this source.

11.3.18 All 1:625,000 scale metadata were downloaded from the BGS website. These are Bedrock Geology, Superficial Deposits and Linear Features.

11.3.19 Geological SSSIs data were provided by Natural England. Geological Conservation Review Sites data were obtained from the Joint Nature Conservation Committee.

Baseline Description

11.3.20 The bedrock geology (geological units as shown on the 1:50,000 geological map, group names and the geological period to which they belong) is summarised in Table 11.5.

Table 11.5 Bedrock geology

Geological unit (as shown on 1:50,000 BGS Mapping)	Group name	Geological period
Earnley Sand Formation	Bracklesham Group	Palaeogene
Wittering Formation		
Bagshot Formation		
Windlesham Formation		

Geological unit (as shown on 1:50,000 BGS Mapping)	Group name	Geological period
Camberley Sand		
Durley Sand Member	Thames Group	
London Clay Formation		
Whitecliff Sand		
Claygate Member		
Lambeth Group - Clay, Silt & Sand	Lambeth Group	
Lambeth Group - Sand		
Tarrant Chalk Member	Chalk Group	Cretaceous
Newhaven Chalk		
Seaford Chalk		
Lewes Nodular Chalk		
New Pit Chalk		
Holywell Nodular Chalk		
Zig Zag Chalk		
West Melbury Marly Chalk		
Upper Greensand Formation	Selborne Group	
Gault Formation		
Folkestone Formation	Lower Greensand Group	
Bargate Sandstone		

11.3.21 The bedrock geology in the study area, from Boorley Green to Bishop's Waltham (Section A), comprises Palaeogene aged strata of the Bracklesham Group (silt, sand and clay), Thames Group (sand, gravel and clay) and Lambeth Group (clay, silt and sand). The Wittering Formation is the only formation present in the Bracklesham Group at this location. From Upham to Crondall (Sections A, B and C), the Cretaceous Chalk Group is present for a large extent and there is a smaller section of the Upper Greensand Formation and Gault Formation of the Selbourne Group between Chawton and Bentley (Section C), both of which represent the rim of the Weald Anticline. From Crondall to West Bedfont (Sections C to H), the Palaeogene aged strata are present again for a large extent with the Bracklesham Group outcrop comprising the Camberley Formation, Windlesham Formation and the Bagshot Formation (Wittering Formation is absent), observed between Church Crookham and Shepperton (Sections D to H). North of Shepperton (Section H) the bedrock geology comprises Thames Group including the Claygate Member and the London Clay.

11.3.22 The superficial geology of the study area (geological units as shown on the 1:50,000 geological map (Figure 8.3), and the age range from within which they formed) is summarised in Table 11.6. Note that Figure 8.3 shows the geological map for the wider area and therefore includes some geological units not described in Table 11.6 below.

Table 11.6 Superficial geology

Geological unit (as shown on 1:50,000 BGS mapping)	Age range
Alluvium	Holocene
Peat	Quaternary
Langley Silt	Quaternary (Devensian)
Head	Quaternary
Clay with Flints	Palaeogene - Pleistocene
River Terrace Deposits (undifferentiated)	Quaternary
Kempton Park Gravel	Quaternary (Devensian)
Shepperton Gravel	Quaternary (Wolstonian)
Lynch Hill Gravel	Quaternary (Wolstonian)

11.3.23 The superficial geology mapping shows superficial deposits are absent over much of the route in Sections A to F. From Boorley Green to Crondall (Sections A to C), undifferentiated River Terrace Deposits are present as small areas associated with the main rivers. From Bishops Waltham (Section A) to Chawton (Section B) Clay with Flints are locally present, particularly between Lower Farringdon and West Tisted (Section A). Head deposits are also present associated with the Clay with Flints.

11.3.24 Superficial deposits are absent from much of the study area between Crondall and Farnborough (Section D), with only localised Head deposits and Alluvium. From Frimley to Lyne (Sections E and F) there are areas of undifferentiated River Terrace Gravels, Alluvium and Head. Peat is locally present in the Chobham area (Section F)

11.3.25 The character of the superficial deposits changes in Sections G and H, with superficial deposits present throughout most of this area. These comprise various terrace gravels, including the Lynch Hill Gravel, the Shepperton Gravel and the Kempton Park Gravel. The gravels are locally overlain by Langley Silt (in the Laleham area, Section H), Alluvium (particularly in Section G).

11.3.26 The BGS Landslides classification mapping (Figure 11.4) shows the majority of the corridor is classified as Class A and Class B: 'Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered'. There are a few very localised areas classified as Class C 'Slope instability problems may be present or anticipated. Site investigation should consider specifically the slope stability of the site' are present within Sections A and B, associated with the presence of Head deposits. A part of the route in Section C is also classified as Class C. This area is associated with the outcrop of the Gault Formation. The area of the Order Limits from Section D to Section H is classified as Class B throughout.

11.3.27 The BGS 1:50,000 mapping of mass movement shows two areas of mass movement 1.5 to 2.5 km from the study area to the south-west of Crondall in Section C. The BGS landslide database also includes one record of a landslide in the same area, around 60m from the study area. All three of these records are associated with the localised outcrop of the Lambeth Group clay, silt and sand, with the mass movement records associated with a steeper valley slopes. The Order Limits pass across this geology for about 700m with gentle topography.

11.3.28 The BGS Soluble Rocks classification shows the potential presence of soluble rocks in Sections A, B and C and the southern end of Section D, with the classification ranging from B to E (the highest classification), and all associated with the Chalk Group. The highest classification is associated with areas of Lambeth Group where it overlies the Chalk Group (in Sections A and Section C). There is a possibility of solution features being present. The BGS British Karst Database shows the presence of several features within the study area which could be 'dolines' (solution features) however the associated notes indicate that the features may also be man-made chalk or brick-clay workings.

11.3.29 There are no Geological Conservation Review sites and no SSSIs in the study area designated on the basis of geological features.

Geology Aspects Value / Sensitivity

11.3.30 The value or sensitivity of geology aspects has been assessed in Table 11.7 below.

Table 11.7 Criteria for determining the value/sensitivity of geology receptors

Aspect / receptor	Value / sensitivity	Rationale for value / sensitivity
Geology	Low	There are no sites designated for geology or geomorphology within the study area.
Unstable Ground	N/A	The presence of unstable ground including natural underground cavities or artificial ground may present particular engineering risks to pipeline projects. This aspect is being taken into account within the engineering design development and addressed by construction methodologies. It is therefore not assessed as part of the EIA and so environmental value/sensitivity is not relevant.
Suitability for Trenchless Technologies	N/A	Ground conditions unsuitable for certain types of trenchless technologies may present challenges to pipeline projects if not identified prior to construction. This aspect is being taken into account within the engineering design development and addressed by construction methodologies. It is therefore not assessed as part of the EIA and so environmental value/sensitivity is not relevant.

Aspect / receptor	Value / sensitivity	Rationale for value / sensitivity
Aquifers	N/A	The presence of high value and sensitive groundwater aquifers in the study area is important to the source-pathway-receptor model used in the assessment of land contamination; these receptors are considered in Chapter 8 Water.

Minerals

Study Area

11.3.31 The study area for minerals comprises the Order Limits as shown in Figure 3.1. Figure 11.5 also shows the available minerals data for the wider area to provide context.

Data Sources

11.3.32 Data requests were made to Surrey County Council (SCC) and Hampshire County Council (HCC) to obtain mineral planning information for the study area. It is a requirement for local planning authorities to show Mineral Safeguarding Areas (and Mineral Consultation Areas) in their districts.

11.3.33 SCC have provided metadata from 2016 which includes Minerals Safeguarding Areas, Existing Minerals and Waste Sites, and Minerals Preferred Search Areas. All the Minerals Preferred Search Areas fall within the Mineral Safeguarding Areas.

11.3.34 HCC supplied some metadata on the Hampshire Minerals and Waste Plan (HWMP) Mineral and Waste Consultation Areas and Mineral and Waste Local Plan Safeguarded Sites. However, they were unable to supply metadata for the 2015 Minerals Consultation Areas (MCAs) due to licence restrictions. Information for the MCAs has been obtained from the HCC website and the BGS geological maps.

11.3.35 There is also information on allocations for minerals in the district authorities' Local Plans. Within Surrey, these sites are included in the Minerals Preferred Search Areas.

Minerals Baseline Description

11.3.36 In the southern part of the Project, Sections A to D, and part of E, minerals data are available from the Hampshire Minerals and Waste Plan.

11.3.37 The Hampshire Minerals and Waste Plan does not include any Mineral Safeguarding Areas in the study area.

11.3.38 The Hampshire Minerals and Waste Plan does include Mineral Consultation Areas which are based on the BGS mineral mapping. For copyright reasons they cannot be shown on Figure 11.5. These include:

- Soft Sand, based on Palaeogene Lambeth Group (sand) and sands of the London Clay Formation north of Boorley Green (Section A);
- Brick Clay, based on the Palaeogene Lambeth Group (clay, silt and sand) west of Bishop's Waltham (Section A) and near Crondall (Section D); and

- Superficial Soft Sand and Gravel near Alton (Section C) and west of Fleet (Section D).

11.3.39 In the northern part of the Project, part of Section E and Sections F to H, minerals data are available from Surrey County Council.

11.3.40 There are no minerals sites designated in Section E. More than half of the study area from south of Lyne (Section F) to the end of the corridor at the West London Terminal storage facility (Section H) is designated as Mineral Safeguarding Areas (concreting aggregate) for Surrey.

11.3.41 Within the Mineral Safeguarding area there are several sites within the study area (Section H) designated as Minerals Preferred Search Areas, and also identified as sites allocated for minerals. These include:

- Home Farm Quarry Extension, Shepperton; already part of the Shepperton Aggregates Authorised Landfill site.
- Queen Mary Reservoir, Sunbury; including land to the west of Queen Mary Reservoir with Reservoir Aggregates Authorised Landfill Site.
- Manor Farm, Laleham; this land appears to be currently undeveloped without any existing extraction or waste permit.
- Homers Farm, Bedfont; this land adjacent to the West London Terminal storage facility appears to be currently undeveloped without any existing extraction or waste permit.

11.3.42 The current status of the mineral sites is not clear from the information available to date. It is not known whether minerals are currently being actively extracted from sites within the study area.

Mineral Aspects Value / Sensitivity

11.3.43 The value or sensitivity of minerals aspects has been assessed in Table 11.8 below (see also Table 11.11).

Table 11.8 Criteria for determining the value/sensitivity of mineral receptors

Receptor	Value / sensitivity	Rationale for value / sensitivity
Surrey Minerals Preferred Search Areas / Minerals Allocations	High	Designated strategic mineral resources within an area with limited accessible minerals. The Project could constrain potential future access to these minerals.
Surrey Mineral Safeguarding Areas	Medium	Strategic mineral resources within an area with limited accessible minerals. The Project could constrain potential future access to these minerals.
Hampshire Mineral Consultation Areas	Medium	Identified mineral resources, however designation is based on geological occurrence which is widespread across the county. The Project affects a small area of the potential resource.

Land Contamination

Study Area

11.3.44 The study area for land contamination is the Order Limits as shown in Figure 3.1, with a 250m buffer zone. The inclusion of a 250m buffer is based on the Guidance for the Safe Development of Housing on Land Affected by Contamination (Environment Agency, 2008). This buffer is a conservative but sensible approach in the context of the Project taking into account the distance over which contamination can migrate.

Data Sources

11.3.45 Metadata with the boundaries of the Authorised Landfills and Historic Landfills were available to download via Open Data from the EA website. Authorised landfills are landfills which are currently authorised by the EA under Environmental Permitting Regulations, in the categories noted in Table 11.9.

Table 11.9 EA landfill categories

Code	Description
A1	Co-disposal landfill Site
A2	Other landfill site taking special waste
A4	Household, commercial & industrial waste landfill
A5	Landfill taking non-biodegradable wastes
A7	Industrial waste landfill (factory curtilage)
5.2 A(1) a)	Waste landfilling; >10T/D with capacity >25,000T excluding inert waste
5.2 A(1) b)	Waste landfilling
L04	Non-hazardous landfill
L05	Inert landfill

11.3.46 Data requests were made to the EA and the appropriate district and borough councils in Surrey (Surrey Heath, Runnymede and Spelthorne) and Hampshire (Rushmoor, Hart, East Hampshire and Winchester) to obtain information on landfills, registered waste transfer sites and other sites they may be aware of with potential significance for land contamination. Data from the EA and several local authorities are still awaited or were not received in time to be included in this report.

11.3.47 The 1:10,000 scale Historical Land Use metadata which date back to 175 years or fewer were purchased from Groundsure to identify potentially contaminative land uses such as petrol stations, garages, tanks, energy installations and military / ordnance sites. The historical land uses within the study area were assigned a preliminary risk ranking of ‘High’, ‘Medium’ or ‘Low’ based on their contamination potential. Pits (potentially infilled ground) were also highlighted since they are frequently not recorded as historic landfills in the dataset.

11.3.48 Locations of current and former HSE COMAH (Health and Safety Executive Control of Major Accident Hazards) sites have been obtained as Metadata from Groundsure. COMAH applies mainly to the chemical industry, but also to some storage activities, explosives and nuclear sites, and other industries where the threshold quantities of dangerous substances identified in the Regulations are kept or used. They have been included in this assessment as they are an indicator of land use with a significant contamination potential.

Land Contamination Baseline

11.3.49 The land contamination baseline data are shown on Figure 11.6.

11.3.50 There are 17 historic landfills in the study area (listed below) with the majority of larger landfills present between West Bedfont and Addlestone (Sections G and H).

- 'Land at Southwood Farm' near Four Marks (Section B);
- 'Land at Manor Farm' in Upper Froyle (Section C);
- 'Redlands / Wildland House' near Crondall, close to the trenchless crossing of the A287 (Section D)
- 'Pyestock Hill' north-east of Church Crookham, close to the proposed trenchless crossing of the A323 and nearby Alton Road (Section D);
- 'South of Frimley Station' in the area of the trenchless crossing of the A331 and '27 Station Road' (Section E);
- 'Redroad Hill' near Lightwater (Section F);
- 'Abbey Moor Golf Club' in Addlestone (Section G);
- 'Chertsey Road Tip', 'Sheep Walk' and 'Lavenders', all are close to or crossed by part of a proposed trenchless crossing of the M3 (Section G);
- 'Littleton Lane', 'S of Queen Mary Reservoir Landfill' and 'SW of Queen Mary Reservoir Landfill' north of the M3 crossing (Section H); and
- 'Clockhouse Lane', 'St. David's School Tip' and 'Heathrow Oil Terminal' in West Bedfont (Section H).

11.3.51 There are four authorised landfills in the study area which occur between Chertsey and West Bedfont (Section H). None of the authorised landfills are classed as Type 5.2 A(1a) (landfill sites permitted to accept non-hazardous and / or hazardous wastes that are "Landfill Directive compliant" and can operate now). The authorised inert landfills are "Landfill Directive compliant" for accepting inert waste.

- 'Brett Landscaping Ltd.' and 'Reservoir Aggregates', both 'accepting other wastes'; and
- 'Home Farm South Landfill' and 'Home Farm Extension Landfill Site' to the north of Shepperton Road accepting inert waste.

11.3.52 The historical land use mapping shows numerous pits (chalk pits, gravel pits and unspecified pits) in the study area which are not recorded as historic landfills. These are mainly in Section A. Some of the pits are recorded as having been infilled (e.g. a chalk pit becomes a refuse pit) while others are not present in later mapping and it can be inferred that they have been infilled. The majority of these pits are small (less than 1 hectare).

11.3.53 There are 70 registered waste transfer site records in the study area (Table 11.10). These are all located within the 250m buffer zone, not within the pipeline route.

Table 11.10 Licence status of waste transfer sites

Licence status	No.
Issued	32
Modified	20
Transferred	2
Closed	6
Expired	2
Surrendered	6
Pollution Prevention & Control (PPC)	2

11.3.54 Historic land uses of interest are shown on Figure 11.6 and are listed below:

- gas valve compound (from 1987) off Maddoxford Lane south-east of Boorley Green (Section A);
- railway sidings and Star Energy oil storage depot (COMAH site) in Holybourne (Section C);
- brick yards (from 1870s), tileries (1900s) and barracks (1930s to 1970s) between Crondall and Church Crookham (Section D);
- railway sidings, gas works (from 1871 off Ship Lane and Union Street in Farnborough), barracks (1900s to 1950s), all in Farnborough / Frimley (Section E);
- Powell Duffryn Fuels Ltd, former COMAH site in Farnborough (Section E);
- Johnson Wax Ltd., former COMAH site (Section E);
- unspecified heap (from 1970s) off Old Littleton Road and unspecified pit (>0.5 Ha) off Chertsey Road south of the M3 crossing in Chertsey (Section G), both associated with historic landfills;
- British Gas former COMAH site and gasworks off Pretoria Road in Chertsey (Section G);
- mineral railway sidings (from 1930s) and an unspecified heap (from 1990) north of the M3 crossing in Chertsey and two unspecified heaps (from 1970s to 1990s) west of Queen Mary Reservoir (Section H), all associated with areas of landfilling;
- gas valve compound (from 1990) west of Queen Mary Reservoir (Section H);
- garage (1970s to 1980s) and sewage works (from 1930s) north-west of Queen Mary Reservoir (Section H);
- railway sidings off the south side of Staines Road in Ashford (Section H);
- sewage works and tanks (from 1930s) in West Bedfont (Section H);

- refuse heap (from 1930s) south of Staines Road in West Bedfont (Section H); and
- Esso Petroleum oil storage current COMAH site at West Bedfont (Section H).

11.3.55 Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area. Esso operates robust procedures to manage the pipeline and prevent leakage.

11.3.56 A multiproduct line is located adjacent to the existing aviation fuel pipeline. This line has been subject to third party damage. However, in each case the fuel loss has been minimal and has been remediated to the satisfaction of the local land owner. Esso has confirmed that in all cases it has a very good proactive relationship with the regulator.

Land Contamination Aspects Value / Sensitivity

11.3.57 Land impacted by contamination can be considered as a source of pollution where it has the potential to affect human and environmental receptors and if there is a viable source – pathway – receptor linkage. It can also be considered as a receptor, if development activities have the potential to affect the contamination resulting in possible movement of the contamination. This would only be the case where new source – pathway – receptor linkages were to be created. This would change the status of the land.

11.3.58 Generally, the receptor sensitivity of land affected by contamination will be linked to the source potential of the previous land use. In practice, both land receptor sensitivity and effect on human and environmental receptors will depend on site specific factors identified as part of a “conceptual site model”. This may include (but not be limited to) the nature and amount of contamination, ground conditions and geology, hydrogeology, surface conditions, presence of permeable pathways, distance to and nature of receptors, site activities and receptor activities.

11.3.59 At this stage there is not enough site-specific information available to develop conceptual site models for individual sites potentially affected by contamination. Therefore, a conservative position has been adopted based on the source potential.

11.3.60 The source potential risk and sensitivity of the sites potentially affected by land contamination aspects has been assessed in Table 11.11.

Table 11.11 Criteria for determining the source potential/sensitivity of sites potentially affected by land contamination

Aspect	Source potential / sensitivity	Rationale for source potential / sensitivity
Authorised and historic landfills (EA database)		
Landfill – authorised, 5.2 A(1) a)	High	Landfill Directive compliant landfills currently authorised to accept waste other than inert waste, are of high source potential. They are of high sensitivity as they will include engineered containment measures and infrastructure which may be compromised by development, resulting in

Aspect	Source potential / sensitivity	Rationale for source potential / sensitivity
		uncontrolled emissions. These active landfills may also be considered as high value as part of existing waste management infrastructure. This is assessed in Chapter 12 Land Use.
Landfill – authorised, L05 Inert	Low	Landfill Directive compliant landfills currently authorised to accept inert waste are of lower source potential and sensitivity as the nature of the waste will limit the potential for gas or leachate generation. These active landfills may also be considered as high value as part of existing waste management infrastructure. The commercial value of these landfills is assessed in Chapter 12 Land Use.
Landfill – authorised, other	Low - High	Landfills which are currently authorised by the Environment Agency under Environmental Permitting Regulations are potentially of high source potential and sensitivity This is because they may have received waste including hazardous substances with the potential to generate landfill gas and leachate, and may have engineered containment which could be compromised by development. Associated risks include direct contact of construction workers with waste, windblown dust, movement of leachate and landfill gas, waste arisings, risk of contaminated dewatering (leachate or adjacent groundwater), post-construction settlement and instability. The source potential and sensitivity of individual sites may be refined as more data become available.
Historic landfill (all)	Varied: Moderate - High	Historic landfills are assessed to be of potentially high source potential and sensitivity as they may have received waste including hazardous substances with the potential to generate landfill gas and leachate. Associated risks include direct contact of construction workers with waste, wind-blown dust, mobilisation of leachate and landfill gas, waste arisings, risk of contaminated dewatering (leachate or adjacent groundwater), post-construction

Aspect	Source potential / sensitivity	Rationale for source potential / sensitivity
		settlement and instability. The source potential and sensitivity of individual sites may be refined as more data become available.
Historic potentially contaminative land uses (Groundsure mapping)		
Specific potentially contaminative land uses as detailed in para 11.3.49	Varied; Moderate - High	These areas are assessed to be of potentially high source potential and sensitivity as the ground at these locations may have been impacted by hazardous substances. Associated risks include direct contact of construction workers with contaminated soil, wind-blown dust, mobilisation of contaminated groundwater, waste arisings, risk of contaminated dewatering. The sensitivity of individual sites may be refined as more data become available.
Industrial estates, depots, warehouses and other potentially contaminative uses assessed as lower risk	Low	Low likelihood of land contamination with significant pollutant linkages; high likelihood of localised made ground.
Potentially infilled historic pits (less than 0.5ha)	Low	Low likelihood of land contamination with significant pollutant linkages; high likelihood of localised made ground.
Potentially contaminated land (Regulator searches)		
Potentially contaminated land	Varied	Data to be assessed when further information requested from EA and local authorities is available.
Existing pipeline infrastructure		
Existing pipeline infrastructure	Low	Low likelihood of land contamination with significant pollutant linkages because operator has procedures in place to manage the pipeline and prevent leakage. Where any loss to ground has occurred from associated activities this has been managed and remediated to the satisfaction of the regulator.

11.4 Likely Significant Effects

Decommissioning

11.4.1 Decommissioning activities would be subject to an appropriate decommissioning strategy, as per Chapter 3. It is not practical to assess the effects of decommissioning at this stage as the methodology and likely good practice mitigation measures will not be defined until closer to the time, at least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

Soils

11.4.2 During the construction phase, effects on soils may include:

- Temporary loss of BMV land. However, this would be of short duration and would be restored back to the landowner's preference.
- Deterioration of soil properties through handling and storage. However, this would be managed through the application of good practice (see Chapter 4) and application of DEFRA guidance, as will be set out in the CoCP and draft CEMP.

Measures included in Chapter 4 would effectively mitigate effects on soils. Effects on soils during construction and operation would therefore be scoped out

- Degradation of soil quality through import of unsuitable materials or movement of contaminated soil to an area previously not affected by contamination. However, this would be managed through good practice, including a contamination watching brief (see Chapter 4).
- Degradation of soil quality through transfer of soil borne invasive weeds. However, this would be managed through good practice, including a contamination watching brief and biosecurity protocols (see also Chapter 7 Biodiversity).
- Deterioration of sensitive soils (peat soils) which are difficult to restore. However, this would be managed through the CoCP, draft CEMP and a watching brief (see Chapter 4).
- Deterioration of soils important for ecological receptors e.g. designated sites or priority habitats. This is considered in Chapter 7 Biodiversity.

11.4.3 On the basis of the above, soils are scoped out (Planning Inspectorate Advice Note 7 questions 5 to 8).

11.4.4 Soils would be unlikely to be impacted during the operation of the pipeline due to the embedded mitigation in the scheme design and operating practices. Soils would therefore be scoped out on the basis of no impact pathway (Planning Inspectorate Advice Note 7 question 1).

Geology

11.4.5 No designated sites of geological importance have been identified. Sites of geological importance are therefore scoped out from further assessment in the EIA (Planning Inspectorate Advice Note 7 question 2).

No designated geology sites have been identified. Impacts on geology would therefore be scoped out.

11.4.6 No significant impact pathways from the operation of the pipeline to geology aspects have been identified. Geology would therefore be scoped out (Planning Inspectorate Advice Note 7 question 1).

Minerals

11.4.7 Effects on minerals during construction may include short term disruption of current mineral extraction activities on adjacent land during construction. This can be managed through agreements with operating companies and can be scoped out due to the short duration of the impact (Planning Inspectorate Advice Note 7 question 5).

11.4.8 The ongoing presence of the pipeline would restrict access to minerals within the pipeline easement and require safe working methods within the vicinity of the pipeline (to avoid impacting ground stability). Therefore, if allocated mineral resources are not extracted prior to construction the pipeline may restrict their use, known as sterilisation. Due to the strategic importance of the mineral resources within an area with limited accessible minerals, this has potential to be a significant effect and therefore this topic cannot be scoped out.

Disruption to mineral sites during construction would be short term. Construction impacts on minerals would be scoped out.
Operational impacts on minerals resources would be scoped in.

11.4.9 There may also be a long term (i.e. during the lifetime of the pipeline) reduction in commercial viability of mineral reserves outside the easement due to reduction of plot size of available minerals. This commercial impact is considered in Chapter 12 Land Use. The impact on minerals during operation would therefore be scoped in.

Land Contamination

11.4.10 Effects related to land contamination during construction may include:

- Health and safety effects:
  - for construction workers coming into contact with contaminated soils or groundwater during construction, by direct contact, ingestion, dermal contact, inhalation of dust;
  - for construction workers coming into contact with landfill gas during construction, with the risk of explosion or asphyxiation if gases are allowed to build up in a confined space;
  - for off-site people and communities (including site users and residents) from exposure to wind-blown dust from contaminated soils during construction; and
  - for off-site human receptors as a result of off-site movement of leachate, contaminated groundwater or landfill gas.
- Impacts to controlled waters:
  - if leachate or contaminated groundwater move during construction resulting in discharge to sensitive aquifers or surface waters; and
  - as a result of dewatering of excavations and then discharge of contaminated water to surface waters.

- Impact to Project infrastructure:
  - resulting from chemicals within the ground which may cause damage to the pipeline. contamination, landfill gas; and
  - relating to movement of the surrounding land (differential settlement and ground instability) in areas of artificial ground such as landfill.
- Impacts related to the disposal of any waste arisings that are unsuitable for reuse as backfill, and the associated requirement for import of clean backfill material (considered in Appendix 7 Waste and Materials).

11.4.11 The significance of the effects related to land contamination would be dependent on:

- the nature and character of the contamination, including composition, concentration and mobility;
- the size of the contaminant source;
- the presence of a viable pathway to connect the contaminant source to a sensitive receptor;
- the presence of a sensitive receptor (and distance to that receptor);
- working methods and use of good practice; and
- prior knowledge of the contaminant source (allowing planning of working methods).

Construction impacts on land contamination would be scoped out for aspects with low source potential (see Table 11.11). These impacts would be scoped in for landfill sites and other aspects with medium/high sensitivity/source potential.

11.4.12 Land contamination on previously developed land is commonly related to the import of made ground and historic site activities. Also contaminants such as heavy metals, polyaromatic hydrocarbons, total petroleum hydrocarbons and low levels of asbestos can be found. Early investigation may give greater confidence in the nature of the ground likely to be encountered at a specific site. The variability of such ground means it is not often practical to fully characterise the ground prior to construction. In this case standard brownfield good practice working methods would include measures to:

- avoid direct worker exposure to soil;
- reduce dust generation;
- a watching brief for land contamination; and
- an agreed plan of action in case unexpected ground conditions are encountered.

11.4.13 These measures would be used to mitigate the potential effects of contamination. Good practices would be included within the CEMP which contractors would work to (see Chapter 4 for summary of good practice mitigation). Based on this approach, aspects of land contamination related to low sensitivity aspects as defined in Table 11.7 above are scoped out (Planning Inspectorate Advice Note 7 questions 2 and 5).

11.4.14 Further assessment and study is needed, including further desk study and regulatory consultation, to assess the potential impacts of other aspects of land contamination including landfills. It would be likely that a number of the areas identified as potentially being of high sensitivity could be discounted for significant effects when further data are available. These data would include the results of targeted and

limited site investigations mainly focussing on engineering feasibility. Aspects of land contamination with a source potential / sensitivity greater than low as defined in Table 11.8, are scoped in.

11.4.15 The ongoing presence of the pipeline would restrict access to ground throughout the period of operation. Contamination requiring remediation maybe identified during the operational phase. However, existing ground conditions would be assessed during construction (see above) and the area at any one location that might be affected in this manner would be relatively small. Therefore, the effect is not considered significant and is scoped out based on the impact not likely to be on a scale that may result in significant effects (Planning Inspectorate Advice Note 7 question 3).

11.4.16 Land contamination aspects related to the pipeline itself acting as a potential contaminant source are not considered significant because of the Project design and operating practices, as described in Chapter 3 (design principles). Also there is empirical evidence for the validity of this approach from the past operation of the existing aviation fuel pipeline (Planning Inspectorate Advice Note 7 question 5). The avoidance of major accidents is considered in Chapter 15.

11.4.17 Land Contamination would therefore be scoped out for operation.

11.5 Impact Assessment Methodology

11.5.1 The methodology which has been followed for the work undertaken to date, and which will be developed during the EIA process, builds on the guidance set out in NPSs EN-1 and EN-4 for environmental effects assessed as likely to be significant. These documents specify that:

- risks posed by contaminated land should be considered; and
- mineral resources should be safeguarded.

11.5.2 Desk-based work has included the review of literature sources and publically and commercially available information available at the time of writing.

11.5.3 Specific methodologies which will be used to assess the different types of potential effects are described below.

Study Area

11.5.4 The majority of the potential effects would be associated with the direct disturbance of ground conditions, although there is also the potential for the migration of contamination from the wider area. The study areas for contamination and mineral resources are as set out in Section 11.3:

- a 250m buffer around the Order Limits for land contamination; and
- for the assessment of the effects on mineral resources, the study area has been identified as the pipeline route. Information for a wider area may also be used to put the information for the route into context.

Consultation and Engagement

11.5.5 As part of the EIA process, the following stakeholders would be engaged and consulted with:

- Surrey County Council and Hampshire County Council mineral planning departments to discuss potential impacts to the Mineral Allocations, Mineral Safeguarding Areas, Mineral Consultation Areas, and agree mitigation measures; and
- the Environment Agency, and district and borough councils of Surrey (Surrey Heath, Runnymede and Spelthorne) and Hampshire (Rushmoor, Hart, East Hampshire and Winchester). Further information will be sought on the specific areas of identified contamination with the intention of lowering the perceived risks and mitigating potential impacts.

Assessment Methodology

11.5.6 The assessment of effects on soils and geology would be in accordance with best practice guidance including:

- establish the current characteristics within the study area, to represent the 'baseline conditions' against which the magnitude of likely effects will be assessed;
- identify potential direct impacts on the baseline conditions and any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects of the Project, for aspects scoped in to the assessment;

- assess the significance of any identified impact on the baseline conditions, taking into account both its potential magnitude and likelihood of the effect and the importance and / or sensitivity of the receptor;
- consider the interactions between the assessed potential effects on receptors when aggregated and / or sequenced;
- identify mitigation measures required to reduce or eliminate potentially negative effects (taking potential cumulative effects into account); and
- assess the significance of any residual effects following implementation of the proposed mitigation measures (and any enhancement opportunities).

11.5.7 The order of magnitude and sensitivity of specific criteria would be assessed. This would allow a study of the significance of their effect. The criteria would be in relation to the following receptors identified through the scoping study:

- receptors of contamination; and
- mineral resources.

11.5.8 The soils and geology impact assessment process would be iterative. Mitigation measures identified as required in early assessments would be incorporated into the design of the Project and inform the CoCP and draft CEMP. This would reduce the potential for significant impacts.

Value/Sensitivity of Receptors

11.5.9 The criteria used to determine the value and sensitivity of receptors specific to soils and geology are set out in Table 11.12. These criteria are based on the generic criteria presented in Chapter 6.

Table 11.12 Criteria for determining the value/sensitivity of soil and geology receptors

Value / sensitivity	Topic specific criteria
High	Contamination: Human receptors i.e. construction workers, future site users, maintenance workers, adjacent land users. Controlled waters, which for this sensitivity include: • nationally or internationally important sites i.e. Ramsar sites, Special Areas of Conservation, Special Protection Areas and SSSIs; • nationally and regionally important watercourses; • public water supplies; • principal or highly productive aquifers with high aquifer vulnerability. Mineral resources: Existing minerals sites, minerals preferred search areas and minerals safeguarded sites.
Medium	Contamination: Controlled waters, which for this sensitivity include:

Value / sensitivity	Topic specific criteria
	• main rivers within a catchment, locally important watercourses • private water supplies serving three or more properties • Secondary A Aquifers Property, which for this sensitivity includes: • crops and domesticated animals (grazing livestock) • infrastructure • buildings Mineral resources: Minerals safeguarding areas, minerals consultation areas
Low	Contamination: Controlled waters, which for this sensitivity include: • minor watercourses or water bodies; • low productivity aquifer (frequently designated as a Secondary B Aquifer); • private water supplies located within the vicinity of a mains water supply or used for agricultural purposes and not for drinking water purposes. Mineral resources: No mineral resources identified.
Negligible	Contamination**:** Controlled waters, which for this sensitivity include: • Unproductive strata that are generally unable to provide usable water supplies. Mineral resources: No mineral resources identified.

Magnitude of Change

11.5.10 The criteria used to determine the magnitude of change are set out in Table 11.13, and are based on the generic criteria outlined in Chapter 6.

Table 11.13 Criteria for determining the magnitude of change to soil and geology receptors

Magnitude of change	Topic specific criteria
Large	Contamination: • Contamination levels encountered in excess of assessment criteria (for human health, environment and/or property) requiring substantial remediation works or treatment; • Substantial volumes of excavated material being designated from a contamination perspective as unsuitable for re-use on-site and

Magnitude of change	Topic specific criteria
	requiring off-site disposal; • Requirement for substantial re-engineering of landfill infrastructure and waste containment systems; • Substantial betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation (benefit). Mineral resources: • Long term (years) loss/sterilisation of the entire identified reserve/resource or extraction
Medium	Contamination: • Contamination levels marginally above assessment criteria (for human health environment and/or property) requiring substantial remediation works or some treatment; • Short term (weeks) exposure of ground impacted by contamination in excess of assessment criteria (e.g. in excavations); • Short term (weeks) discharge of groundwater impacted by contamination in excess of assessment criteria (e.g. dewatering); • Moderate volumes of excavated material being designated from a contamination perspective as unsuitable for re-use on-site and requiring off-site disposal; • Requirement for minor re-engineering of landfill infrastructure and waste containment systems; • Moderate betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation (benefit). Mineral resources: • Long term (years) loss/sterilisation of a substantial part of the identified reserve/resource or extraction; • Loss of access to the whole of the identified resource (although the reserve/resource remains intact); • Extraction and beneficial use of the entire identified reserve/resource (benefit).
Small	Contamination: • Contamination levels below human health or environment assessment criteria but minor remediation / mitigation works required as a result of impact to property or infrastructure; • Small volumes of excavated material being designated from a contamination perspective as unsuitable for re-use on-site and requiring off-site disposal; • Requirement for re-engineering of landfill infrastructure (not extending into the landfill waste containment system);

Magnitude of change	Topic specific criteria
	• Slight betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation (benefit). Mineral resources: • Long term (years) loss/sterilisation of a minor part (<30%) of the identified reserve/resource or extraction • Extraction and beneficial use of part of the identified reserve/resource.
Negligible	Contamination: • Contamination levels below human health, environment and property assessment criteria and no remediation required; • Very minimal to no material excavated being designated from a contamination perspective as unsuitable for re-use on-site and requiring off-site disposal; • Requirement for slight or negligible re-engineering of landfill infrastructure (not extending into the landfill waste containment system); • Negligible betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation (benefit). Mineral resources: • Short term (weeks/months) loss of access to a minor part of the identified resource (although the reserve/resource remains intact).

Assessment of Significance

11.5.11 An environmental effect may be significant if, in the professional judgement of the expert undertaking the assessment, it would meet at least one of the following criteria:

- it leads to an exceedance of defined guidelines or widely recognised levels of acceptable change (which will be different for different topics within the EIA);
- it is likely that the consenting authority would reasonably consider applying a planning condition, requirement or legal agreement to the consent to require specific mitigation to reduce or overcome the effect;
- it threatens or enhances the viability or integrity of a receptor or receptor group of concern; or
- it would be likely to be material to the ultimate decision about whether or not the application for development consent should be approved.

11.6 Summary Scope for the EIA

11.6.1 Table 11.14 summarises the aspects and potential effects that have been scoped in or out of further assessment in the EIA.

Table 11.14 Matters of significance for geology and soils

Receptor	Matter / potential effect	Locations	Comments
Soil	During construction	Throughout study area	Scoped out. Loss would be temporary and of short duration. Risk of deterioration during construction would be managed by good construction practices which will be secured in the CoCP and draft CEMP.
Geology		Throughout study area	Scoped out. No sites designated as of geological importance within study area. Potential risks associated with unstable ground addressed in engineering design development.
Mineral resources	During construction	Surrey, from Lyne to West London Terminal storage facility	Scoped out. Short term impact during construction; longer term impacts are assessed under operation.
	During construction	Hampshire, various locations	Scoped out. Short term impact during construction; longer term impacts are assessed under operation.
Mineral resources	During operation	Surrey, from Lyne to West London Terminal storage facility	Scoped in. Strategic importance of the mineral resources within an area with limited accessible minerals.
	During operation	Hampshire, various locations	Scoped in. Strategic importance of the mineral resources within an area with limited minerals.
Land contamination	During construction	Various locations throughout study area	Scoped in. Potentially contaminated sites of medium/high sensitivity/ source potential, including landfill sites, have been identified within the study area. Ground disturbance associated with the Project has the potential to mobilise contamination creating new pollutant linkages and waste soil arisings. Assessment required to assess the potential impacts of the Project

Receptor	Matter / potential effect	Locations	Comments
			on these sites.
	During construction	Various locations throughout study area	Scoped out. Potential risks to replacement pipeline infrastructure associated with potentially contaminated land of low source potential would be addressed in engineering design development. This includes unstable ground, land with chemical activity and creation of new migration pathways. Short term risks to human and environmental receptors during construction would be managed by good construction practices.
Land contamination	During operation	Throughout study area	Scoped out. There would be no ground disturbance during operation. Risks to human and environmental receptors during operation would be managed by good operational practices.

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Chapter 12
Land Use

Scoping Report Volume 1

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12. Land Use

12.1 Introduction

12.1.1 This chapter outlines the likely significant effects on land use as a result of the construction and operational phases of the Project.

12.1.2 Land use aspects include:

- residential property including associated buildings such as garages and sheds, gardens and parking areas;
- community facilities – commercial or public authority managed facilities for use by the whole community e.g. doctors' surgeries, schools, hospitals, sports facilities, churches and recycling sites;
- community land – land which is established public recreational resource such as country parks, woodlands, playgrounds, parks, nature reserves and waterways;
- commercial property such as industrial businesses including landfill sites, leisure centres and utilities;
- commercial land such as commercial forestry used for timber production, sports grounds, roads, railways and allotments;
- development land – major land allocations for housing through the Local Planning Authority's Local Plans and major committed development with current planning permissions;
- agricultural land – land used for the practice of cultivation or rearing stock to produce food products; and
- direct impacts on forestry land.

12.1.3 Soil aspects including effects on agricultural soil, productivity, and sensitive and vulnerable soils are considered in Chapter 11 Soils and Geology.

12.1.4 Effects on communities are considered in Chapter 13 People and Communities. Effects include temporary changes in access to residential, commercial and community receptors and areas of recreation; and disruption to communities more widely.

12.1.5 Arboricultural effects are covered within Chapter 10 Landscape and Visual.

12.1.6 Changes in view and their effects on visual receptors are covered within Chapter 10 Landscape and Visual.

12.1.7 Chapter 12 was written by a technical expert in the field of land use currently employed by Jacobs. He has over 29 years' experience in the consultancy sector. His qualifications are BSc Honours in Agriculture and he is a Member of the Institution of Environmental Sciences.

12.2 Key Legislation, Policy and Guidance

12.2.1 The land use assessment for the Project considers the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations). There is no other legislation specific to the environmental assessment of land use associated with the Project.

Policy

National Policy Statement (NPS) EN-1

12.2.2 NPS EN-1 includes consideration of land use, open space, green infrastructure and Green Belt land. Paragraph 5.10.6 outlines that applicants need to consult the local community on their proposals to build on open space, sports or recreational buildings and land. Paragraph 5.10.8 states that the impacts to best and most versatile (BMV) agricultural land should be minimised where possible.

12.2.3 Whilst EN-1 and EN-4 remain the prime decision making documents, where they do not provide guidance, the following may also be considered important and relevant guidance that may require consideration by the decision making authority. At this stage, it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State and it is included for completeness to allow the Secretary of State to make such a determination. In considering these policies it should be noted that the Local Authorities and SDNPA are not the decision maker for the Project.

National Planning Policy Framework

12.2.4 NPS EN-4 gives no guidance on land use assessment. Therefore, the National Planning Policy Framework (NPPF) has been referenced. This states that local planning authorities should take into account the economic and other benefits of the BMV agricultural land. Where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality agricultural land in preference to that of higher quality.

Local Plans

12.2.5 Each of the local planning authorities has a Local Plan, each at various stages of adoption and review (as shown in Appendix 2). Many of the Local Plans include specific policies with regard to the protection of BMV agricultural land and allocation of land for development such as housing. They also aim to retain, enhance and increase the quantity and quality of open space, leisure and recreation facilities.

Government Guidance

12.2.6 The land use assessment for the Project is based on guidance presented in DMRB Volume 11, Section 3, Part 6 Land Use (Highways Agency, 2001).

12.2.7 The following UK government web pages provide guidance on matters covered in this chapter:

- https://www.gov.uk/government/publications/safeguarding-our-soils-a-strategy-for-england: sets out a clear vision to guide future policy development and provide objectives including that, by 2030, all of England's soils will be managed sustainably and degradation threats tackled successfully (published April 2011).
- https://www.gov.uk/government/publications/the-natural-choice-securing-the-

value-of-nature: guidance that emphasises the importance of protecting our soils and the services including the protection of best and most versatile agricultural land (published June 2011).

- https://www.gov.uk/guidance/environmental-stewardship (published September 2012): sets out guidance for environmental stewardship schemes.
- https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites: the code outlines guidance and legislation on the management of soil on construction projects (published March 2011).
- https://www.gov.uk/government/publications/agricultural-land-assess-proposals-for-development/guide-to-assessing-development-proposals-on-agricultural-land#use-alc-to-support-your-planning-decisions: Guide to assessing development proposals on agricultural land (published January 2018).

12.3 Baseline Conditions

Study Area

12.3.1 The study area for the purpose of this scoping assessment comprises the route and associated Order Limits (see Figure 3.1 and Figure 3.2, Volume 2). In addition, statistical data of the wider area available from DEFRA has been reviewed to calculate average farm sizes, labour, cropping and livestock along the route and in the surrounding area.

Desktop Study

12.3.2 An initial desktop study was undertaken to identify the existing land use and committed development within the construction corridor. The following resources were used:

- Ordnance Survey mapping;
- Aerial and satellite photographs;
- OS Address Base Plus data;
- DEFRA Agricultural Statistical Data;
- Environmental Stewardship, Woodland Grant Scheme and Energy Crop Scheme data from MAGIC website.
- Agricultural Land Classification (ALC) data from Natural England Open Data; and
- Local Planning Authorities websites for the adopted local plan containing major housing allocations; and website search for current committed development.

Residential Property

12.3.3 The Project has been designed to avoid settlements where practicable to reduce the risk of disruption to property and land use (see Chapter 4 Design Evolution).

12.3.4 The construction corridor passes through the urban areas of Farnborough and Ashford. It also borders several settlements including Bishop's Waltham, Alton, Fleet, Lightwater, Addlestone and Chertsey.

12.3.5 The study area includes a number of residential properties located in the settlements of Alton, Church Crookham, Fleet, Farnborough, Ottershaw, Addlestone and Ashford.

Community Facilities and Land

12.3.6 As noted in Chapter 3 Description of the Development, the Project consists of eight Sections from Boorley Green to West London Terminal storage facility. Community land located within the study area includes recreational areas such as playgrounds, public parks, nature reserves and woodland/forestry used for recreation. There are also several community facilities located within the study area including educational facilities, bus shelters and one health facility. These are summarised in Table 12.1 below.

Table 12.1: Community facilities and land in the study area per Section

Community type	Sections								Total
	A	B	C	D	E	F	G	H	
Recreational Land *	-	-	-	1	3	4	5	7	**20**
Nursery/School/College	-	-	-	-	2	2	1	4	**9**
Bus Shelter	-	-	-	-	9	3	-	2	**14**
Hospital/Health Clinic	-	-	-	-	1	-	-	-	**1**
Community Centre	-	-	-	-	1	-	1	1	**3**
Ministry of Defence Site	-	-	-	1	1	1	-	-	**3**
Total	**0**	**0**	**0**	**2**	**17**	**10**	**7**	**14**	**50**

* Recreational land contains all commercial and non-commercial forestry due to limited information. Further study is required to differentiate between commercial and non-commercial forestry use.

Commercial Property and Land

12.3.7 The majority of commercial properties and land within the study area are located within Section E of the route. There are a limited number of commercial properties and land in the Sections in the southern extents of the Project as it is a mainly agricultural area. The route passes through a range of commercial property and land. These are mainly:

- utilities (e.g. areas of land owned by utility companies that are used for electricity sub-stations, pumping stations or telecommunications);
- industrial businesses (e.g. landfill sites and manufacturing businesses); and
- commercially run sports grounds/centres (including gyms, playing fields and golf courses).

12.3.8 These have been outlined in Table 12.2 below.

Table 12.2: Commercial property and land in the study area per Section

Commercial type	Sections								
	A	B	C	D	E	F	G	H	Total
Industrial	1	-	1	1	1	3	-	4	**11**
Sport centre/ grounds	-	1	-	4	3	3	3	1	**15**
Livery	-	1	-	-	-	-	-	-	**1**
Utility	1	-	1	3	7	6	2	7	**27**
Business/technology/ retail park	-	-	-	2	-	1	1	-	**4**
Allotment	-	-	-	-	2	-	-	-	**2**
Fishery	-	-	-	-	1	-	-	-	**1**
Car parking/ park and ride site	-	-	-	-	1	-	-	2	**3**

Commercial type	Sections								
	A	B	C	D	E	F	G	H	Total
Bus/train station	-	-	-	-	1	-	-	1	**2**
Retail/shop	1	-	-	2	-	2	-	3	**8**
Caravan site	-	-	-	-	-	-	1	-	**1**
Total	**3**	**2**	**2**	**12**	**16**	**15**	**7**	**18**	**75**

Agricultural Land

12.3.9 Within Sections A, B and C (Boorley Green to Crondall), the majority of the study area is agricultural land, specifically ALC Grade 3 land. Higher quality land (ALC Grade 1 and Grade 2 land defined, together with Grade 3a land, as BMV land) is also present near Boorley Green and Chawton.

12.3.10 Within Sections D to H (Crondall to the West London Terminal storage facility) the construction corridor is located mainly within urban and non-agricultural land, but does include some agricultural areas

12.3.11 The ALC for the study area is further described in Chapter 11 Soils and Geology and quantified in Table 11.3.

12.3.12 Within Hampshire and Surrey, the most common farm size is 5-20ha (around a third of farms) out of a total 2,153 holdings in Hampshire and 938 in Surrey. Lowland grazing livestock is the main farm type within both counties, followed by cereals and general cropping. The distribution of all farm types is shown in Figures 12.1 and 12.2 below. Within both counties approximately half of the farms support arable farming systems and half support livestock farming systems.

12.3.13 There is a small part of the route (Section H) within the London Borough of Hounslow. This is non-agricultural land and would not be considered further within this Section.

Figure 12.1: Surrey farm type by number of holdings

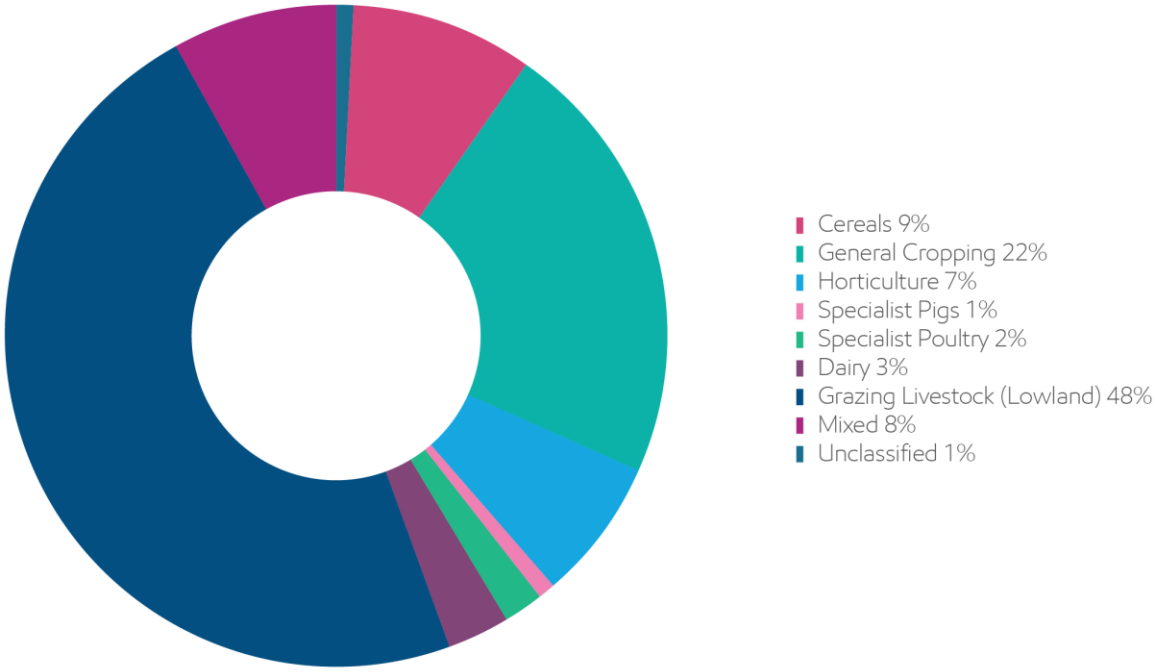
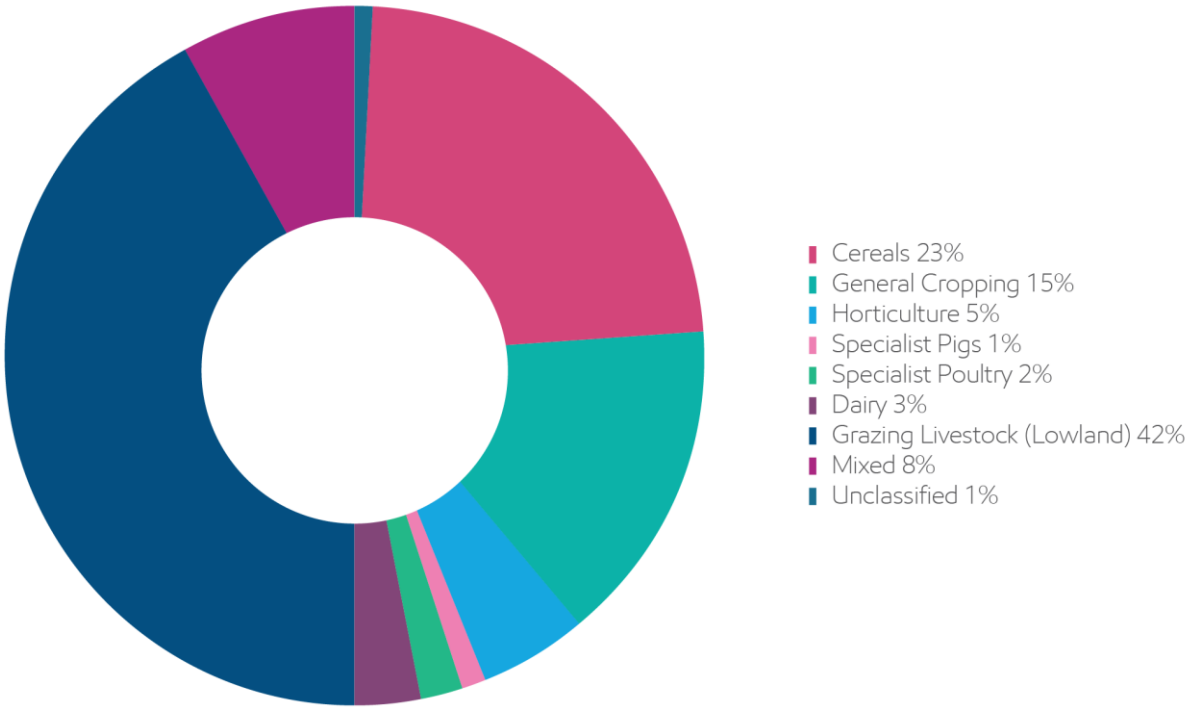


Figure 12.2: Hampshire farm type by number of holdings



12.3.14 The majority of grazing livestock includes sheep and cattle. Both counties also support a large variety of poultry, mostly laying flock (43%) in Surrey and broilers (69%) in Hampshire. The most popular arable crops across the counties of Surrey and Hampshire include cereals (mainly wheat), oilseed rape and maize.

12.3.15 DEFRA also provides a breakdown of key crop areas and livestock numbers on agricultural holdings by Local Authority. Table 12.3 shows data for the local authorities within the study area. The most popular cropping is cereals and grassland. This grassland supports cattle (5%), sheep (8%), pigs (3%) and poultry (84%).

Table 12.3: Key crop areas and livestock numbers by Local Authority (DEFRA, 2016)

Local authority	Crops areas (ha)				Livestock numbers			
	Cereals	Arable crops (excl cereals)	Fruit and vegetable	Grass land	Cattle	Sheep	Pigs	Poultry
Hampshire								
Southampton & Eastleigh	352	196	28	1,467	1,816	2,756	239	4,905
Winchester	19,353	7,301	330	13,005	17,326	15,032	16,342	542,719
East Hampshire	10,677	4,207	187	10,456	8,749	29,781	2,548	21,191
Hart & Rushmoor	3,004	1,579	35	3,522	3,125	5,517	315	7,923
Surrey								
Runnymede	86	#	#	413	186	344	#	5,138
Woking & Surrey Heath *	0	#	#	945	943	317	62	894
Elmbridge & Spelthorne *	0 341	0 183	0 124	1,869	#	2 755	#	#
Total	**33,814**	**13,465**	**0 703**	**31,678**	**32,145**	**56,502**	**19,506**	**582,769**

# indicates that data have been suppressed to prevent disclosure of information about individual holdings, therefore totals may not necessarily agree with the sum of their components.

* Agricultural statistical data from DEFRA has been combined by Local Authority. Individual data by Local Authority were not available.

12.3.16 There are several Common Agricultural Policy (CAP) funded land management schemes administered by DEFRA and Natural England. These schemes include, Environmental Stewardship, Countryside Stewardship and the Woodland Grant Scheme. Although the Countryside Stewardship scheme closed to new applicants in 2014, existing agreements will remain active until they reach their agreed end date.

12.3.17 Table 12.4 outlines the proportion of land within the study area that is subject to land management schemes. The Entry Level Stewardship and Entry Level plus Higher Level Stewardship forming options within the Environmental Stewardship scheme, are the most common land management agreements within the area. They are all within Hampshire, mostly in the South Downs and Hampshire Downs areas.

12.3.18 One farm (located near Upper Froyle) has an Organic Entry Level land management scheme (it is also subject to land management agreement under the Higher Level Stewardship scheme).

Table 12.4: Land management schemes within the study area

Land management scheme		Area within study area	
		(ha)	(%)
Environmental Stewardship	Entry Level Stewardship	30.34	7
	Entry Level plus Higher Level Stewardship	43.86	10
	Organic Entry Level plus Higher Level Stewardship	1.45	<1
	Higher Level Stewardship	62.58	14
Countryside Stewardship	Mid Tier	9.42	2
	Higher Tier	7.40	2
Woodland Grant Scheme		5.20	1

Development Land

12.3.19 The majority of major housing allocations and committed development sites have been avoided as much as possible. Where major committed development sites are in the study area, the project team are in conversation with the developers and are confident that the route can be accommodated in the proposed development layouts, for example within road layouts, open space and landscape areas. There are a limited number of major housing allocations and committed development sites across the Project. The Order Limits pass through a small number of sites allocated for development by Local Planning Authorities or which have a current planning permission. These have been outlined in Table 12.5.

Table 12.5: Approximate number of development land types by Section

Development land type	Sections								
	A	B	C	D	E	F	G	H	Total
Major housing allocation sites (based on adopted LPA planning policy)	0	0	0	0	0	0	0	0	**0**
Major committed development sites (based on current planning permissions)	7	1	0	7	7	1	2	0	**25**
Total	**7**	**1**	**0**	**7**	**7**	**1**	**2**	**0**	**25**

12.3.20 With reference to Table 12.5:

- The approximate totals are as at time of publication of this report and the numbers are subject to change. The information is based on LPA websites.
- The number of sites are based on sites that are contained within the Order Limits shown in Figure 3.1 and Figure 3.2 (Volume 2).
- The major housing allocation sites are from adopted Local Plans and sourced from LPA websites.
- The major committed development sites are based on the LPAs' classification of major development in relation to planning permission. In addition, the scale and number of dwellings are not representative in Figure 3.1 and Figure 3.2 (Volume 2). A major development application is classified when applications are greater than 10 dwellings.

12.4 Likely Significant Effects

Decommissioning

12.4.1 Decommissioning activities would be subject to an appropriate decommissioning strategy, as per Chapter 3 Description of the Development. It is not practical to assess the effects of decommissioning at this stage as the methodology and likely good practice mitigation measures will not be defined until closer to the time, at least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

Residential Property

12.4.2 The Project is unlikely to require the demolition of any residential property. However, during the construction phase, effects on residential property may include:

- removal of a separate ancillary structure such as a garage or shed;
- temporary loss of land such as garden and/or parking area; and
- temporary loss of access and boundary features.

12.4.3 The significance of the effects related to residential property would be dependent on:

- type of impact e.g. removal of ancillary structures and/or loss of land;
- proportion of loss of land;
- duration of disruption to the receptor; and
- working methods and use of good practice mitigation as described within Chapter 4 Design Development.

Any temporary loss of access to residential properties or temporary loss of boundary features are scoped out.

12.4.4 Any temporary loss of access to residential properties or temporary loss of boundary features would be managed through good practice described within the Chapter 4 Design Evolution, which will be defined in the CoCP. Therefore, these effects on residential properties are not likely to be significant and are scoped out from further assessment in the EIA (Planning Inspectorate Advice Note 7 question 5).

12.4.5 If demolition becomes necessary, further assessment and study will be needed to assess the potential significance of the loss of buildings, plus temporary loss of land use from residential property. This would be undertaken as part of the EIA.

12.4.6 Existing residential land use is unlikely to be affected during the operational stage of the Project. This is as the pipeline would be mainly below ground and operating practices would be minimal.

Operational effects from the Project are scoped out.

12.4.7 There will be approximately 10 Valve locations and one new Pigging Station situated within the Order Limits. These total approximately 0.03ha of permanent loss of land which is less than 1% of the study area. As there would only be a small permanent loss of land, likely significant effects are not anticipated and therefore are scoped out (Planning Inspectorate Advice Note 7 question 3).

Community Facilities and Land

12.4.8 During the construction phase, effects on community facilities and land may include:

- demolition of associated facilities;

- temporary loss of community land; and
- temporary loss of access and boundary features.

12.4.9 The significance of the effects related to community facilities and land would be dependent on:

- the nature and character of the community facility/land, including size and level of importance (local, regional or national);
- proportion of temporary loss of land;
- duration of disruption to the receptor; and
- working methods and use of good practice mitigation as described within Chapter 4.

Any temporary loss of access to community facilities or land or temporary loss of boundary features are scoped

12.4.10 Any temporary loss of access to community facilities or land, plus temporary loss of boundary features would be managed through good practice described within Chapter 4 which will be defined in the CoCP. Therefore, these effects on community facilities are unlikely to be significant and land are scoped out (Planning Inspectorate Advice Note 7 question 5).

12.4.11 Further assessment and study is needed to assess the temporary loss of land from community facilities and demolition. This would be undertaken as part of the EIA.

12.4.12 Existing community land use is unlikely to be affected during the operational stage of the Project. This is as the pipeline would be mainly below ground and operating practices would be minimal.

12.4.13 As there would only be a small permanent loss of land, likely significant effects are not anticipated and therefore are scoped out (Planning Inspectorate Advice Note 7 question 3).

Operational effects from the Project are scoped out.

Commercial Property and Land

12.4.14 Effects related to commercial property and land during construction may include:

- demolition of associated commercial property;
- temporary loss of commercial land; and
- temporary loss of access and boundary features.

12.4.15 The significance of the effects related to commercial property and land would be dependent on the same topics listed for community facilities.

12.4.16 Any temporary loss of access to commercial facilities or land or loss of boundary features would be managed through good practice described within Chapter 4 which will be defined in the CoCP. Therefore, these effects on commercial facilities and land are not likely to be significant and are scoped out (Planning Inspectorate Advice Note 7 question 5).

Any temporary loss of access to commercial property or land or temporary loss of boundary features are scoped out.

12.4.17 Further assessment and study is needed to assess the temporary loss of land from commercial property and land. This would be undertaken for the EIA.

12.4.18 Existing commercial land use is unlikely to be affected during the operational stage of the Project. This is as the pipeline would be mainly below ground and operating practices would be minimal. There may be some sterilisation of land use (for example landfill sites), however, these effects are not expected to be significant. As there would only be a small loss of permanent land, likely significant effects are not anticipated and are therefore scoped out (Planning Inspectorate Advice Note 7 question 3).

Operational effects from the Project are scoped out.

12.4.19 The commercial aspects of transfer of wastes from the Project to landfill or waste treatment facilities is assessed within Appendix 7 Waste and Materials Technical Note. Based on the current estimates, there are five main types of waste generated. The assessment has been conducted based on the ability for all waste facilities and landfills within the South East of England to cope with the quantities of each type of waste. The following types and their percentage of capacity in waste facilities (including landfills) within the Hampshire, Surrey and South East are shown in Table 12.6.

Table 12.6 Expected waste production from the Project

Type of waste	Expected quantity (tonnes)	Percentage of capacity in the South East (%)
Wastes generated from directional drilling	580	0.004% of physical treatment and inert landfills in Surrey and Hampshire.
Inert waste (from temporary hardstanding)	132,000	0.8% of physical treatment and inert landfills in Surrey and Hampshire.
Waste from historic and authorised landfills	3,300 (inert waste)	0.02% of the inert landfills in Surrey and Hampshire.
	5,500 (hazardous waste)	1.1% of hazardous waste landfills in the South East region.
Other construction wastes (including waste from road excavations, concrete, plastics etc.)	11,000	0.07% of physical treatment and inert landfills in Surrey and Hampshire.
Total (rounded to the nearest thousand)	152,000	n/a

12.4.20 The effects of waste production on commercial landfill and waste facility sites in the South East are therefore scoped out. (Planning Inspectorate Advice Note 7 question 3).

Agricultural Land

12.4.21 Effects on agricultural land during construction may include:

- demolition of an agricultural building such as a barn or cattle shed;
- temporary loss of agricultural land;
- temporary loss of access and boundary features;
- disruption to livestock water supply;
- disruption to field drainage system;
- disruption to any land management agreement, woodland grant scheme or energy crop scheme; and
- temporary severance of agricultural fields, limiting land use and access for machinery and livestock.

12.4.22 The significance of the effects related to agricultural land would be dependent on:

- the farm size and type;
- proportion of land lost;
- type of land management agreement;
- duration of disruption to the receptor; and
- construction methods and application of good practice mitigation as described in Chapter 4.

The following impacts on agricultural land are scoped out:

- temporary loss of access
- loss of boundary features
- disruption to field drainage systems, livestock or water supply.

12.4.23 Through good practice described within Chapter 4 there would likely be no significant effects caused by temporary loss of access, loss of boundary features or disruption to livestock water supply and field drainage system. Therefore, these effects on agricultural land are scoped out from further assessment in the EIA (Planning Inspectorate Advice Note 7 question 5).

12.4.24 Further assessment and study is needed to assess the potential impacts of other aspects of agricultural land. This would include temporary loss of land, temporary field severance and disruption to land management agreements. This would be undertaken for the EIA.

12.4.25 Existing land use is unlikely to be affected during the operational stage of the Project. This is as the pipeline would be mainly below ground and operating practices would be minimal.

Operational effects from the Project are scoped out.

12.4.26 As there would only be a small loss of permanent land, likely significant effects are not anticipated and therefore are scoped out (Planning Inspectorate Advice Note 7 question 3).

Development Land

12.4.27 During the construction phase, effects on development land may include:

- temporary loss of development land; and
- temporary loss of access and boundary features.

Any temporary loss of access to development land or temporary loss of boundary features are scoped out.

12.4.28 The significance of the effects related to development land would be dependent on:

- the nature and type of development land, including size and level of importance and timing of construction of the development;
- proportion of loss of land;
- duration of disruption to the receptor; and
- working methods and use of good practice as described in Chapter 4.

12.4.29 Any temporary loss of access to development land or temporary loss of boundary features would be managed through good practice described within Chapter 4 which will be defined in the CoCP. Therefore, these effects on development land are unlikely to be significant and are scoped out (Planning Inspectorate Advice Note 7 question 5).

12.4.30 Further assessment and study is needed to assess the temporary loss of development land. This would be undertaken as part of the EIA.

12.4.31 Following the completion of the pipeline and its commissioning, the width of permanent easement would be 3m either side of the pipeline along its length. It is expected that in general the design of new development may be able to incorporate this easement into open space or landscape areas without significant impact on the developable area of the land. The existing pipeline was constructed before much of the development present today and has not sterilised developable land or resulted in any derelict land. This aspect is therefore scoped out (Planning Inspectorate Advice Note questions 2 and 3).

12.5 Impact Assessment Methodology

12.5.1 The assessment would cover a study area extending to the Order Limits of the Project.

12.5.2 The impact assessment methodology has been determined by consulting PINS Advice Note 7 (The Planning Inspectorate, 2017). It is also based on guidance presented in DMRB Volume 11, Section 3, Part 6 Land Use (Highways Agency, 2001). DMRB has been used as it provides guidance for linear projects.

12.5.3 Chapter 6 Impact Assessment Methodology presents the overall environmental assessment significance methodology for the Project. However, the definition of a significant effect depends on the environmental aspect or receptor. Professional judgement would be used to assign each land use a value/sensitivity using the criteria set out in Table 12.7.

Table 12.7 Criteria for value/sensitivity of land uses

Value/Sensitivity	Characteristics
High	• Residential and commercial property and community facilities. • Large areas under land management scheme agreements. • Intensive arable farming or intensive livestock systems.
Medium	• Residential, commercial and community land. • Moderate sized areas under land management scheme agreements. • Mixed cropping and livestock systems of moderate intensity. • Major committed development land.
Low	• Derelict land or unoccupied buildings. • Small areas of land under land management scheme agreements. • Extensive livestock systems or agricultural land in non-agricultural use.

12.5.4 The magnitude of impact of the various impacts would be determined and an overall magnitude assigned for each land use using the criteria set out in Table 12.8.

Table 12.8 Criteria for magnitude of impacts on land uses

Magnitude	Description of effect
Large	• Demolition of associated residential property, community facility or commercial property (e.g. garage, shed or annex) or agricultural building (e.g. barn or cattle shed). • Temporary loss, greater than 50% of total, of any land use type (agricultural, commercial, etc.). • Temporary loss of any land use for 12 months or longer.

Magnitude	Description of effect
Medium	• Temporary loss between 25% and 50% of total, of any land use. • Temporary loss of any land use for between 6 months and 12 months.
Small	• Temporary loss between 5% and 25% of total, of any land use. • Temporary loss of any land use for between a period of 1 month and 6 months.
Negligible	• No change or very slight change from baseline condition. No change or change hardly discernible, approximating to 'no change' in conditions. • Temporary loss of any land use for less than 1 month.

12.5.5 The overall likely significant effect would take into account value/sensitivity and magnitude, as set out in Chapter 6 Impact Assessment Methodology. Those land use aspects with a likely significant effect would be further reviewed. This would determine whether or not the community facility, commercial or agricultural business would remain viable. The assessment of effects on the likely future viability of land use aspects would be undertaken using the following criteria. These have been developed by the Project using professional judgement:

- No Significant Effect: the business/facility would be affected by the land-take requirements of the Project, which may result in a reduction or restructuring of its activities, but this does not compromise the likely future viability of the business/facility. The business would be able to continue trading, but may require some restructuring of its operations.
- Significant Beneficial Effect: the business/facility would likely be able to continue trading and developing as planned.
- Significant Adverse Effect: the business/facility may have to reduce its activities to a point where it becomes unviable, it requires to be relocated, or chooses to cease trading due to the Project.

12.6 Summary Scope for the EIA

12.6.1 Table 12.9 presents a summary of the topics scoped in and out of the EIA.

Table 12.9 Matters of significance for land use

Receptor	Matter / potential effect	Locations	Comments
Residential property	Demolition of a separate ancillary structure such as a garage or shed.	All Sections *	Scoped in
	Temporary loss of gardens and/or parking areas.	All Sections	Scoped in
	Temporary loss of access and boundary features.		Scoped out
Community land and facilities	Demolition of associated facilities.	All Sections *	Scoped in
	Temporary loss of community land.	Sections D to H	Scoped in
	Temporary loss of access and boundary features.		Scoped out
Commercial property and land	Demolition of associated commercial property.	All Sections *	Scoped in
	Temporary loss of commercial land.	All Sections	Scoped in
	Temporary loss of access and boundary features.		Scoped out
Waste	Capacity within waste facilities.	In the South East of England	Scoped out
Agricultural Land	Demolition of agricultural buildings such as barn or cattle shed.	All Sections *	Scoped in
	Temporary loss of agricultural land.	All Sections	Scoped in
	Temporary loss of access and boundary features.		Scoped out
	Disruption to livestock water supply.		Scoped out
	Disruption to field drainage system.		Scoped out

Receptor	Matter / potential effect	Locations	Comments
	Disruption to any environmental agreement or woodland grant scheme.		Scoped in
	Temporary severance of agricultural fields, limiting land use and access for machinery and livestock.		Scoped in
Development Land	Temporary loss of development land.	All Sections	Scoped in
	Temporary loss of access and boundary features.	All Sections	Scoped out
	Future sterilisation of land allocations.	All Sections	Scoped out
All	Effects from pipeline operation.	All Sections	Scoped out

* Further assessment and study is required to confirm the location of any potential demolition therefore all Sections will be considered as part of the EIA.

Chapter 13
People and Communities

Scoping Report Volume 1

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13. People and Communities

13.1 Introduction

13.1.1 This chapter outlines the potential for significant effects on 'People and Communities' as a result of the construction and operation of the Project. The description of the development is detailed in chapter 3.

13.1.2 In this context, 'effects' refers to the potential social and economic consequences of the Project on human populations (i.e. people and communities) within the study area(s) outlined below. These effects are linked to the way in which people live, work, play, relate to one another, organise to meet their needs and generally operate as members of society.

13.1.3 The scope of the 'People and Communities' assessment consists of the following matters:

- employment;
- economy;
- tourism;
- effects on communities; and
- public safety.

13.1.4 The consideration of some effects requires input from other environmental discipline areas, particularly those that may contribute to any potential significant effects on communities. These may include the combination of some, or all, of the following environmental topics: air quality, noise and vibration, landscape and visual, and traffic and transport. The combination of some, or all, of such effects contribute to the overall level of community disruption.

13.1.5 Effects on agricultural land and associated businesses are considered within the Land Use chapter (Chapter 12 Land Use).

13.1.6 At this stage effects on equality and health and well-being have been identified and considered separately (see Appendix 8.4 and Chapter 14 Health Impacts, respectively). In addition, potential effects on community cohesion arise when there is a combination of significant effects experienced by a community. However, it can only be considered after the detailed assessment of effects on communities has taken place. So while community cohesion effects are not explicitly included in this scoping report, they will be integrated into the 'People and Communities' assessment in the Environmental Statement.

13.1.7 Chapter 13 was written by a technical expert in the field of socio-economics and is currently employed by Jacobs. She has 16 years' experience in the consultancy sector and 5 years in academia. Her qualifications include a BA in Natural Science and an MSc in Ecological Economics. She is also a full member of the Chartered Institution of Water and Environmental Management.

13.2 Legal Requirements

13.2.1 Key project related legislation is detailed in Chapter 2 Regulatory Context of this Scoping Report. Legislation and planning policy specifically relevant to the 'People and Communities' assessment are outlined below.

Legislation

The Countryside and Rights of Way Act 2000 (CRoW)

13.2.2 This Act makes provision for public access to the countryside. It gives the public the right to access certain areas mapped as 'open country' or registered common land, known as open access land. It emphasises the rights of the public to use open access land for recreational purposes (Natural England, 2014).

National Parks and Access to the Countryside Act 1949

13.2.3 In accordance with the Environment Act 1995, National Park Authorities in England and Wales must follow two statutory purposes. These are:

- conserve and enhance the natural beauty, wildlife and cultural heritage; and
- promote opportunities for the understanding and enjoyment of the special qualities of National Parks by the public (National Parks, 2018).

Policy

National Policy Statements for Energy (NPS) EN-1 and EN-4

13.2.4 National Policy Statement EN-1 sets out the Government's overarching policy with regard to the development of NSIPs in the Energy sector. It states that the socio-economic assessment should outline the existing socio-economic conditions in the areas surrounding the Project and consider all potential effects of the Project in terms of employment, equality, community cohesion and well-being, including:

- the creation of jobs and training opportunities;
- the provision of additional local services and improvements to local infrastructure, including the provision of educational and visitor facilities;
- effects on tourism;
- the impact of a changing influx of workers during the different construction and operation phases of the Project; and
- cumulative effects.

13.2.5 EN-1 also states that the assessment should demonstrate how the socio-economic impacts correlate with the objectives of local planning policies.

13.2.6 EN-4 identifies effects to be considered for natural gas and oil pipelines and includes noise and vibration, biodiversity, landscape and visual, water quality and resources and soil and geology. There is no specific mention of considering socio-economic impacts or effects on communities.

13.2.7 Whilst EN-1 and EN-4 remain the prime decision making documents, where they do not provide guidance, the following may also be considered important and relevant guidance that may require consideration by the decision making authority. At this stage it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State and it is included for completeness to

allow the Secretary of State to make such a determination. In considering these policies it should be noted that the Local Authorities and SDNPA are not the decision maker for the Project.

National Planning Policy Framework (NPPF)

13.2.8 This policy framework sets out the Government's planning policies for England and how these are expected to be applied. It details the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. The NPPF constitutes guidance for local planning authorities and decision-takers. For NSIPs such as the SLP Project, NPS EN-1 and EN-4 remain the prime decision making documents.

13.2.9 According to the NPPF local planning authorities should seek opportunities to meet the development needs of their area. The focus of the NPPF is to encourage sustainable development. The areas relevant to the 'People and Communities' assessment are:

- ensuring the vitality of town centres;
- supporting a prosperous rural economy;
- promoting healthy communities;
- protecting Green Belt land; and
- facilitating the sustainable use of minerals.

13.2.10 Planning policies should ensure economic growth in rural areas including job creation, and taking a positive approach to sustainable development, through supporting sustainable rural tourism and leisure developments.

Local Plans and Policies

13.2.11 The individual Local Plans for each local authority are described in Appendix 2. Key Local Plans relevant to the assessment are listed below:

- East Hampshire Local Plan (2014).
- Winchester and South Downs National Park Authority (SDNPA) Joint Core Strategy 2013.
- South Downs Local Plan.

13.2.12 Key points of these plans seek to support the economic and social wellbeing of communities, including those within the South Downs National Park, whilst protecting of the natural beauty, wildlife and cultural heritage of the National Park area.

13.3 Baseline Conditions

Desktop Study

13.3.1 An initial desktop study was undertaken to understand the environmental, social and economic baseline for the Project. The findings of this desktop study are presented below. Reference is made to Sections A to H: in order to aid design development and assessment, the route was broken down into eight separate sections, A to H. These are described in Chapter 3, paragraph 3.3.3 and table 3.1.

Study Area

13.3.2 The study area(s) for the 'People and Communities' assessment takes into account that effects may be experienced at varying distances from the Project. For example, local effects including community severance or changes in access, and regional effects such as expenditure in the regional economy.

13.3.3 A Local Area of Influence (LAI), a buffer zone of 500m from the boundary of the Order Limits, has been identified as being sufficient to encompass effects to sensitive receptors (i.e. residential properties, commercial businesses, community facilities, areas of recreation and schools). The LAI is also considered to be sufficient to consider potential effects on tourism receptors (i.e. tourism attraction, tourist accommodation and events). However, key receptors that fall outside this area which could be affected are also be considered.

13.3.4 Potential effects on employment, economy and the tourism sector as a result of the Project are examined at county-level (comprising of the counties of Hampshire and Surrey). The effects of the Project on the economy are also considered within the context of the national economy where there is potential for such effects.

13.3.5 Table 13.1 summarises the study areas for the 'People and Communities' assessment and are shown in Figure 13.1.

13.3.6 The Project is situated within Hampshire and Surrey, with the exception of a short distance (up to 60m) within Esso's West London Terminal storage facility within the London Borough of Hounslow and the administrative area of the Greater London Authority (GLA). The LAI therefore extends into the GLA area, but given the small size of this area within the LAI, it was determined that including GLA data would not add additional value to the assessment. Therefore, GLA data is not explicitly presented in the baseline section below.

Table 13.1: Study area(s) for the 'People and Communities' assessment

Matter	Potential Effects	Geographical Scope
Employment	Positive or adverse effects on employment.	County-level – (Hampshire and Surrey)
Economy	Potential effects of the Project on the national and local economies (supply chains).	National Economy - England
		County-level – (Hampshire and Surrey)
Tourism	Tourism receptors: potential effects of the Project on tourism attractions, tourist accommodation, events and the associated change in visitor behaviour at a local level as a result of the Project.	Local Area of Influence (LAI) – The LAI represents a buffer zone of 500m from the boundary of the Order Limits . Furthermore, the Project Sections have been classified as either 'Rural' or 'Urban' based on population density. On this basis, Sections A – C are the 'Rural' Sections, while Sections D – H are the 'Urban' Sections.
	Worker accommodation: potential effects on accommodation stocks as a result of the Project.	County-level (Hampshire and Surrey)
	Tourism sector: potential effects of the Project on the tourism sector more widely.	County-level (Hampshire and Surrey)
Effect on Communities	Potential effects of severance or changes in access to residential, commercial, community receptors and areas of recreation as well as any potential disruption to communities.	LAI – The LAI represents a buffer zone of 500m from the boundary of the Order Limits . Furthermore, the Project Sections have been classified as either 'Rural' or 'Urban' based on population density. On this basis, Sections A – C are the 'Rural' Sections, while Sections D – H are the 'Urban' Sections.
	Potential effects on schools.	
Public Safety	Potential effects on public safety (i.e. Potential change in crime rates (including the potential for a public perception of a possible increase in crime) as a result of the Project.	

Communities and Population

13.3.7 Hampshire and Surrey are two of nine counties that comprise of the South-East region of England.

13.3.8 In 2016, the South East region was estimated to have a population of just over 9 million (Office for National Statistics (ONS), 2016). Surrey had a mid-year population of 1,176,549, and Hampshire 1,360,426. Together, these two counties make up 28% of the total population for the region.

13.3.9 In 2011, the population density of Surrey was 6.8 persons per hectare, compared to Hampshire which had 3.6 persons per hectare, reflecting a level of urbanisation in Surrey. Surrey is also more densely populated (a larger concentration of people per hectare), than the South East (4.5) and England (4.1) averages (Nomis, 2011).

13.3.10 The majority of the population close to the Project are located within the communities of Hedge End and Botley (Section A), Alton (Section C), Fleet (Section D), Farnborough and Frimley (Section E), Lightwater (Section F), Chertsey (Section G), Addlestone and Ashford (Section H). These communities are shown in Figure 13.2. The Sections of the replacement pipeline route are located in Figure 3.2.

13.3.11 There are several other smaller communities with clusters of commercial and community receptors located within each Section.

13.3.12 There are two schools within the LAI of Sections A, B and C (Rural). There are 38 schools within the LAI in Sections D to H (Urban).

Employment and Economy

13.3.13 The employment rate in 2017 in Hampshire and Surrey was 81.1% and 78.7% respectively (ONS, 2017). These are both higher than the regional average (78.4%) and national average (74.7%). The unemployment rate was 2.5% in Hampshire and 2.8% in Surrey in 2017, both considerably lower than the regional (3.4%) and national (4.6%) averages (ONS, 2017).

13.3.14 In 2016, gross value added (GVA) per head for the region was £28,506. This is greater than the average GVA per head within Surrey, East and West Sussex (£27,958) and Hampshire and the Isle of Wight (£26,296) (county specific data was not recorded by the ONS). Surrey, East and West Sussex GVA per head is greater than the national average whereas Hampshire and Isle of Wight is in line with the national average of £26,584 (ONS, 2016b).

13.3.15 There were 35,000 persons employed in the construction industry in Hampshire in 2016, while there were 31,000 employed in similar roles in Surrey. Those employed in construction represent approximately 6% of total employment in both counties combined (Nomis, 2016).

13.3.16 In 2017, Hampshire had 60,765 total businesses, with the greatest number in professional, scientific and technical activities (20.1%). This was followed by wholesale and retail (14.4%) and construction (13.9%) (Nomis, 2017). Surrey had a similar pattern with professional, scientific and technical activities having the largest number of business (24.4%). The second and third largest sectors by business number were information and communication (12.9%) and construction (12.2%) (Nomis, 2017). Together the total number of businesses in the counties contribute to 30.9% of the regional total and 5.4% of the national total (Nomis, 2017).

13.3.17 Between 2010 and 2017 the total number of businesses in Hampshire have increased by 17%, with the largest increase seen in the electricity and gas sector (89%). The number of construction businesses in Hampshire grew by 11% (Nomis, 2017). The total number of businesses in Surrey increased by 19% between 2010 and 2017, with the largest increase also seen in the electricity and gas sector (83%). The construction sector saw a 14% increase in total businesses (Nomis, 2017).

Tourism

13.3.18 There are a number of tourism attractions, of varying sizes and significance, and several tourist accommodations, located within the LAI.

13.3.19 Section A and B of the Project cross the SNDP. The SDNP extends from Winchester, in the west, to Eastbourne, in the east, and covers an area of over 1,600 square kilometres (SDNPA, 2013). According to the 2015 Visitor Survey of the Park, people were generally visiting the SDNP to walk, watch wildlife or cycle, with 99% of visitors rating their enjoyment of the park as high or very high. Three quarters of visitors are day visitors or local residents. Only 5% of visitors said they were staying overnight within the National Park (SDNPA, 2016). The location of the SDNP in respect to the Project can be seen in Figure 13.1.

13.3.20 An estimated 18.4 million trips were made to the South East, with 48.5 million staying overnight bringing an associated expenditure of £2,816 million to the region (Visit Britain, 2017), such expenditure representing just over 1% of the total value of the economy of the South East, valued at £250 billion in 2015 (UK Parliament, 2016). The South East had the second highest tourism expenditure in the UK. Within the counties, there were 3,722,000 visits to Hampshire and 1,435,000 visits to Surrey between 2014 and 2016. Of these, 23% were for a holiday (the remaining trips were for business and to visit family and friends – this data was not separated from total trips). Both counties had associated expenditure from these visits of £584 million and £170 million respectively (Visit Britain, 2016).

13.3.21 Room occupancy in the South East was 68% in 2017, down 1% from 2016, but up 2% from 2015. Bedspace occupancy was 50% in 2017 and 2016, an increase of 3% from 2015 (Visit England, 2017). More localised data regarding potential sources of worker accommodation was not available at the time of writing.

13.3.22 Some tourism attractions along the length of the Project include Jane Austen's House Museum, Thorpe Park (outside the LAI) and Tweseldown Race Course (used for events). A list of tourism attractions and tourist accommodation within the LAI are provided in Table 13.2 and Figure 13.3.

Table 13.2: Tourism receptors within the LAI

Section	Tourism Receptors
<u>Rural Sections</u>	
Section A	• Old Farm House (Attraction) • Stable Farm Caravan Site (Accommodation)
Section B	• Whitehouse Farmhouse (Accommodation)
Section C	• West End House B&B (Accommodation) • Froyle Park (Accommodation) • The Anchor Inn (Accommodation)

Section	Tourism Receptors
Urban Sections	
Section D	• Tweseldown Race Course (Attraction) • Basingstoke Canal (Attraction)
Section E	• Broadmead Place (Accommodation) • Premier Inn Farnborough (Accommodation) • Farnborough Travelodge (Accommodation) • Premier Inn Farnborough (Town Centre) (Accommodation) • House of Fisher Equinox Place (Accommodation) • SACO Aparthotel Farnborough (Accommodation) • The Ship Inn (Accommodation) • Frimley Lodge Miniature Railway (Attraction) • The Royal Logistic Corps Museum (Attraction)
Section F	• Chobham Common (Attraction) • High Curlet Hill Summit (Attraction; N.B. the summit is outside the LAI, but paths leading to summit are within the LAI) • Blind Fire Paintball (Attraction) • 17 Vista B&B (Accommodation) • Foxhills Club & Resort (Accommodation) • Great Cockcrow Railway (Attraction)
Section G	• Foxglove Close (Accommodation) • The Bridge Hotel & Boat House Restaurant (Accommodation) • Chertsey Camping & Caravanning Club Site (Accommodation)
Section H	• Shepperton B&B (Accommodation) • Pure Apartments (Accommodation)

13.3.23 Both Hampshire and Surrey have several annual or bi-annual festivals and events taking place in 2018, largely between May and August. Events and festivals have the capacity to attract visitors from the surrounding area and elsewhere in the UK and abroad. Table 13.3 provides details of the events held across both counties and their distance from the Project. The events are also shown on Figure 13.4.

Table 13.3: Annual or bi-annual events held in Hampshire and Surrey

Hampshire County		
Event	**Description**	**Distance from Project**
Boomtown Festival	Four-day music festival expected to attract 60,000 spectators in 2018 (Boomtown, 2018).	8km north-west of the Project at Matterley Estate.
Farnborough Airshow	A weeklong event that runs every two years in mid-July (Farnborough International Ltd., 2018). In 2014, it had 110,000 trade visitors and over 100,000 public visitors (Hotten, 2014).	Within 1km of the Project at Farnborough Airport.
Weyfest	A three-day music festival with a 5,000 capacity for each day (eFestivals, 2018).	11km south of Farnborough in Tilford.

Hampshire County		
Event	**Description**	**Distance from Project**
Common People Festival	A two-day music event that 40,000 attended in 2017 (UK Festivals Guides, 2018).	9km west of the Project in Southampton.
Jane Austen Regency Week	This event runs for nine days in June each year in the centre of Alton (Visit Hampshire, 2018). This event began in 2005 and has been gaining patronage ever since with a steady increase in attendance.	1km from the Project.
Surrey County		
Chertsey & Shepperton Regatta	One-day regatta held in Dumsey Meadow in Chertsey.	Within the Order Limits.
Ascot Racecourse	Racecourse used for events all year round. Royal Ascot is a 5-day event in June (Ascot Racecourse, 2018).	6.5km north-west of the Project.
The Epsom Derby (Investec Derby)	A large event located at Epsom Downs Racecourse Surrey. In 2017, this event attracted over 150,000 visitors (Investec Derby Festival, 2018).	17.5km south-east of the Project.
The Surrey County Show	The largest one-day agricultural show in the UK (Visit Surrey, 2018). It attracts around 30,000 visitors each year and is held at Stoke Park (Surrey County Agricultural Society, 2018).	13km south-east of the Project.
Wings and Wheels	A five hour airshow and two-hour motoring show to celebrate British aviation and motoring, helping to fundraise for a number of charities. The event attracts between 25,000 and 40,000 spectators each year (Wings and Wheels, 2018).	25km south-east of the Project at Dunsfold Park aerodrome.

Recreational Activities

13.3.24 There are a large number of Public Right of Ways (PRoW) and several cycle routes within the LAI. These could be used for recreational activities such as walking, jogging, running, cycling and equestrian use. Two routes (Route 223 and Route 4) which are intersected by the Project form part of the national cycle network (NCN). Route 223 travels from Chertsey to Shoreham-by-sea. Route 4 is a long-distance route between London and Fishguard (Sustrans, 2018).

13.3.25 The Project intersects three long distance walking routes (LDWR) used for recreational purposes. Two are National Trails, the South Downs Way (Section A) and the Thames Path (Section G). Both routes are popular with locals and tourists, particularly the Thames Path which provides a recreational route in a dense urban area. The South Downs Way is also a well-used equestrian route through the SDNP. One European

LDWR intersects the Project, E-Route 2 (Dover to Middleton in Teesdale). This route runs down central England (The Long Distance Walkers Association, 2018).

13.3.26 Publicly accessible land, such as parks, moors, heaths and downs, are popular for recreational activities such as walking, dog walking and photography. There are a number of such areas that are intersected by the route, including Chobham Common National Nature Reserve (Section F), Chertsey Meads Local Nature Reserve (Section G), and Queen Elizabeth Park in Farnborough (Section E). There are other, smaller pockets of publicly accessible land located throughout the length of the Project, particularly as the Project proceeds towards the Esso West London Oil Terminal storage facility.

13.3.27 PRoW, national cycleways, LDWR, National Trails and areas of publicly accessible land within the LAI are shown in Figure 13.5.

Crime

13.3.28 In 2017, Hampshire had a total of 205,239 reported crimes. The largest percent of crime was caused by anti-social behaviour (26%), followed closely by violent crimes (25%), then criminal damage (9%) (UKCrimeStats, 2017). Surrey has similar patterns of crime, but overall had fewer reported crimes in 2017 with 96,096 crimes reported. Again, anti-social behaviour made up the largest percent of crime (27%), followed by violent crime (21%) and then criminal damage (10%) (UKCrimeStats, 2017b).

13.4 Likely Significant Effects

13.4.1 This section outlines the potential for likely significant effects relating to the 'People and Communities' assessment.

13.4.2 Decommissioning activities would be subject to an appropriate decommissioning strategy, as per Chapter 3 Description of the Development. It is not practical to assess the effects of decommissioning at this stage as the methodology and likely good practice mitigation measures will not be defined until closer to the time, at least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

13.4.3 The potential effects of the Project, with respect to employment, economy, tourism, effect on communities, and public safety are outlined below. These effects may occur during construction and/or operation of the Project:

- Employment: effects on employment.
- Economy: effects on national and local supply chains.
- Tourism: Potential effects of the Project on tourism receptors (tourism attractions, tourist accommodation, events) and the associated change in visitor behaviour at a local level as a result of the Project. Potential effects of the Project on the tourism sector more widely are also considered as well as the potential for effects on the availability of accommodation for workers.
- Effect on communities: effects of severance or changes in access to residential, commercial, community receptors and areas of recreation as well as any potential disruption to local communities more widely. Potential severance and disruption effects on schools and other community receptors are also considered.
- Public safety: Potential change in public safety (including the public perception of a possible increase in crime) because of the Project.

13.4.4 The significance of these potential effects largely depends on the duration of the effect in any given location. The duration of potential effects and their potential for significance has been informed by mitigation described in Chapter 4 Design Evolution and supporting project information. These measures will form part of the Code of Construction Practice (CoCP) which will be adhered to by the contractor throughout the construction phase of the Project.

13.4.5 Potential effects associated with each matter are discussed further below. Where no significant effects are expected, the effect has been scoped out of the 'People and Communities' assessment. Effects are scoped out in line with the Planning Inspectorate Advice Note 7 guidance.

Potential significant effects may occur:

- During construction:
  - communities in rural and urban areas from traffic, noise and vibration, visual, community severance and change in access; and
  - tourism receptors and the associated change in visitor behaviour in rural and urban areas.
- During operation, there are no significant effects anticipated as a result of the Project.

Employment

Construction

13.4.6 The construction workforce for the rural sections (Sections A-C) is likely to consist of a maximum of eight construction gangs of 10 people, within each Section. This would mean a total of 240 construction workers would be required for the construction of the Project in rural areas for the duration of the works.

13.4.7 Each of the urban sections (Sections D-H) would consist of a maximum of six construction gangs of 10 people, within each section. This would mean a total of 300 construction workers would be needed for the construction of the Project in urban areas for the duration of the works.

13.4.8 If construction works in rural and urban areas are run in parallel, a total of 540 construction workers would be required on the Project simultaneously. Given the already high rate of total persons employed, and employed in construction, (see paragraph 13.3.13) within the counties of Hampshire and Surrey, and the fact that this additional demand is equivalent to 0.8% increase in employment in the local construction sector and 0.05% in the total employed locally, it is expected that the number of direct jobs required for the Project will not have a significant effect on the existing labour market. It may be the case that if local supply chain companies service the Esso contracts for the Project that this labour demand will serve to safeguard employment rather than represent new positions of employment.

13.4.9 Additionally, the direct employment during the construction of the Project is not expected to result in a significant number of indirect or induced job opportunities within the local labour market.

13.4.10 It is therefore anticipated that there would be no potential for significant effects during construction of the Project in rural and urban areas in respect to employment given the information outlined above. Therefore, it has been scoped out of the 'People and Communities' assessment (Planning Inspectorate Advice Note 7 question 3).

Operation

13.4.11 Employment opportunities during the operation of the Project are expected to be very limited as maintenance and general operations of the Project would be undertaken by an existing workforce, likely to be those located at the Esso's Fawley Refinery and the West London Terminal storage facility, which the Project would help safeguard. Therefore, the creation of indirect and induced employment opportunities is also considered to be limited, and not significant, during operation.

13.4.12 It is anticipated that there would be no potential significant effects during the operation of the pipeline in rural and urban areas in respect to employment. Therefore, consideration of such potential effects has been scoped out of the 'People and Communities' assessment (Planning Inspectorate Advice Note 7 question 3).

Economy

Construction

13.4.13 It is anticipated that the material for the pipeline itself would be procured and constructed through existing company supply chains, therefore it is likely to be constructed overseas and not within the UK. It would then be transported by sea in segments, through a commercial port and transported to site using appropriate

logistics and practices (see Chapter 3 Description of the Development).

13.4.14 Construction in rural areas (Sections A to C) will predominantly use open cut trenching across agricultural land. This land would be reinstated using the existing soil where possible following the installation of the pipeline at these locations. There would be little or no requirement to procure additional material or resources to reinstate sections of hardstanding within these areas.

13.4.15 In urban areas (Sections D to H), a greater proportion of the works are anticipated to take place along roadways or areas of hardstanding as the environment is more developed. This may require additional material to be procured for reinstatement purposes following the breaking of ground and laying of the pipeline. Supply chain opportunities are expected to be minimal however and may be filled through Esso's existing supply chain. They may not necessarily be available to local suppliers.

13.4.16 It is anticipated that the potential effects of the construction phase of the Project would be beneficial, albeit not significant on the economies of Hampshire or Surrey or the UK more widely. The economic activity associated with the procurement of materials and services during the construction phase in rural and urban areas is not expected to be large enough to contribute a significant beneficial effect on the national or local supply chains. These effects in rural and urban areas have therefore been scoped out of the 'People and Communities' assessment (Planning Inspectorate Advice Note 7 question 3).

Operation

13.4.17 The existing pipeline is particularly important to the national economy. However, as the Project is intended to replace the existing pipeline, its operation is not expected to bring additional benefits to the national economy. The operation of the pipeline will maintain the existing level of service. In addition, as the pipeline would not provide communities with a direct service, there is no potential for significant effects on the local economy during operation.

13.4.18 For the reasons outlined above, consideration of such potential effects on national and local supply chains have been scoped out of the 'People and Communities' assessment (Planning Inspectorate Advice Note 7 question 3).

Tourism

Potential Effects on Tourism Receptors - Construction

13.4.19 Within Sections A-C there are several tourism receptors located within the LAI, as shown in Table 13.2 and Figure 13.3, comprising of a mix of tourism attractions and tourist accommodation.

13.4.20 The potential for significant effects in relation to air quality (including dust), traffic and transport, community severance and changes in access are not anticipated within rural areas due to the duration and scale of construction activity (as set out in Appendix 8). As a result, such effects are not considered further when determining potential significant effects on tourism receptors in rural areas.

13.4.21 There is the potential for significant noise, vibration and visual effects from construction activities in rural areas (see Appendix 8). These effects have the potential to cause significant disruption to these tourism receptors given their close proximity to the Project. This disruption could lead to an adverse change in visitor behaviour within the LAI.

13.4.22 As stated in paragraph 13.3.10, Sections D to H are located across largely urban areas in Hampshire and Surrey. Within these Sections there are a number of tourism receptors located within the LAI, as outlined in Table 13.2 and shown in Figure 13.3. These receptors comprise of a mix of tourism attractions and tourist accommodation.

13.4.23 The potential for significant effects in relation to air quality (including dust), are not anticipated within urban areas during construction as outlined in Appendix 8, and are therefore not considered further.

13.4.24 Potential significant effects relating to noise and vibration, traffic and transport (Appendix 8) and landscape and visual effects (Chapter 10 Landscape and Visual Effects) may occur within urban areas during construction. The combination of these effects has the potential to create significant disruption near to tourism receptors within urban areas due to construction activity being undertaken nearby.

13.4.25 As communities within Sections D to H are more concentrated than rural areas, there is the potential for significant effects in terms of community severance and changes in access on tourism receptors.

13.4.26 The combination of potentially significant community disruption, community severance and change in access effects could lead to an adverse, and potentially significant, effect on visitor behaviour within the LAI.

13.4.27 It is also recognised that one event, the Farnborough Airshow (see Table 13.2), is located within the LAI and has the potential to experience disruption during construction. However, the construction programme is expected to avoid the area when the event is in progress (as outlined in Chapter 4 Design Evolution), and therefore no significant effects are anticipated.

13.4.28 Community severance, changes in access and disruption to tourism receptors are expected to be temporary and only occur during construction. There is the potential for significant adverse effects on tourism receptors - tourism accommodation and attractions - as well as associated visitor behaviour in rural and urban areas. Therefore, the consideration of such effects has been scoped into the 'People and Communities' assessment.

Potential Effects on Tourism Receptors - Operation

13.4.29 There is not expected to be any potential for significant effects on tourism receptors - tourism attractions, tourist accommodation, or events – in rural or urban areas during operation as the pipeline would be situated underground.

13.4.30 As a result of this, there is also no potential for significant effects on associated visitor behaviour during the operation of the pipeline. Therefore, the consideration of such effects (disruption, community severance and changes in access) on tourism receptors have been scoped out of the 'People and Communities' assessment (Planning Inspectorate Advice Note 7 question 3).

Potential Effects on Accommodation

13.4.31 As outlined above (see paragraph 13.4.6 to 13.4.8), there is anticipated to be a maximum of 540 workers required during the construction phase of the Project. These workers are expected to be spread evenly across the route of the Project during its construction, as construction work is linear, not fixed to one location and is expected to progress along a number of work fronts within each Section of the Project. It is envisaged that each work front will require 10 workers.

13.4.32 With construction activity not fixed to any one location for a prolonged period and, to some extent, to be undertaken by those already in employment (paragraph 13.4.8), workers are expected to reside locally and commute to site on a daily basis, travelling by car or public transport. If alternative accommodation is required by workers on occasion, demand in any given location is unlikely to be significant given the linear, unfixed and mobile nature of construction, while there is expected to be only 10 workers per work front.

13.4.33 Due to the nature of construction activity, there is the potential for two work fronts to be in close proximity to one another. In these instances, worker numbers are expected increase by a multiple of two (to a maximum of 20 workers), which could lead to an additional requirement for alternative accommodation in the area during construction. The potential for such additional requirements for alternative accommodation is not considered significant however, relative to the number of local accommodation providers within a short distance of the Project.

13.4.34 Given the nature of construction and the number of workers per work front, this should allow for a dispersed and low demand for accommodation and therefore not result in a significant demand on local accommodation providers (Planning Inspectorate Advice Note 7 question 1).

13.4.35 As outlined in paragraph 13.4.11, a very limited number of workers would be required during operation of the Project to maintain and operate the pipeline. As this existing workforce is currently employed at Esso's Fawley refinery and West London Terminal storage facility, it is assumed that they would reside locally and would not require alternative local accommodation. Therefore, potential effects on worker accommodation are not expected during operation and have been scoped out of the 'People and Communities' assessment (Planning Inspectorate Advice Note 7 question 1).

Potential effects on the Tourism Sector - Construction

13.4.36 Potentially significant effects identified during construction with respect to tourism receptors within each Section would be considered collectively to determine if they could result in a wider significant adverse effect on the tourism sector. As this cannot be assessed until the tourism receptor assessment is complete, the consideration of potentially significant effects on the tourism sector has been scoped in to the 'People and Communities' assessment.

Potential effects on the Tourism Sector - Operation

13.4.37 There is not anticipated to be any potential for significant effects on tourism receptors or on the associated visitor behaviour during the operation of the Project. Consequently, there is also not expected to be any potential for significant effects on the tourism sector as a result of the operation of the Project. The consideration of such effects has been scoped out of the 'People and Communities' assessment (Planning Inspectorate Advice Note 7 question 3).

Effect on Communities

Construction

13.4.38 Construction of the Project within rural and urban areas would predominantly use an open-trench technique of pipe-laying. Trenchless methods would be employed to cross railway lines and selected major roads and watercourses (see Chapter 3 Description

of the Development).

Rural Areas

13.4.39 The Order Limits in rural areas (Section A - C) are expected to be on average 30m wide approximately along the length of the Project. Within these sections the Project is expected to progress at an average rate of 450m per week.

13.4.40 As set out in Appendix 8, significant air quality effects (including dust), and traffic and transport effects are not expected in rural areas. These are scoped out of the 'People and Communities' assessment (Planning Inspectorate Advice Note 7 question 3). Community severance and changes in access are also not expected due to the duration of construction in any one location. As such, these effects are also scoped out (Planning Inspectorate Advice Note 7 question 3).

13.4.41 Taking the construction method and duration into consideration, it is anticipated that there is the potential for significant noise, vibration and visual effects to occur (Appendix 8 and Chapter 10 Landscape and Visual Effects, respectively) within the LAI. As may be expected, the potential for significant impacts is greatest closest to the construction activity. For example, significant noise effects may occur for residential receptors in rural areas only within 50m of construction activity, while vibration effects may only be significant within 60m (see Appendix 8, Table A8.3.6 and A8.3.47-48). These are conservative distances however, as physical features within the rural environment (e.g. vegetation) will provide local screening to mitigate such effects and reduce the distance within which effects may be experienced. Further detail on construction noise and vibration effects within rural areas are provided in Appendix 8.3 Noise and Vibration.

Consideration of effects in rural areas:

- Dust, traffic, community severance and change in access – scoped out.
- Disruption (noise, vibration and visual effects) - scoped in.

13.4.42 As outlined in paragraph 13.4.33, the nature of construction presents the potential for two work fronts to be in close proximity to one another. In these instances, it is recognised that there will be heightened disruption for communities close to these work fronts.

13.4.43 Where significant noise, vibration and visual effects occur within local communities in rural areas, there is the potential for significant community disruption and therefore the consideration of community disruption has been scoped into the 'People and Communities' assessment.

13.4.44 It is worth noting that there are only two schools (Brockwood Park School and Four Marks Church of England Primary School) within the LAI of Sections A, B and C. Neither school is expected to be directly impacted by the construction of the Project as they are situated away from the route. They are, however, anticipated to be potentially impacted by significant noise, vibration, and visual effects, as outlined in the previous paragraph. The consideration of potentially significant effects on schools within rural areas are therefore scoped into the 'People and Communities' assessment.

Urban Areas

13.4.45 As mentioned in paragraph 13.3.10, Sections D to H are located within the communities of Fleet, Farnborough, Frimley, Lightwater, Chertsey, Addlestone and Ashford. These areas are developed and heavily populated. Given the urban setting in

which each of these sections are situated, there are more constraints surrounding the route, potentially leading to more significant effects on communities.

13.4.46 As a result, the Order Limits in urban areas are expected to be much more restricted than the 30m width that was available in rural areas. Construction of the Project within Sections D to H is anticipated to progress at a rate of approximately 90m per week. Works are anticipated to take place along roadways and other urban spaces in close proximity to a large number of sensitive receptors (i.e. residential properties, care homes, hospitals, schools, etc.).

Consideration of effects in urban areas:

- Severance and changes in access - scoped in.
- Disruption (traffic, visual, noise and vibration effects) - scoped in.

13.4.47 The construction method proposed to be used in urban areas (as outlined above - 13.4.36) presents the potential for significant noise, vibration, traffic and transport, and visual effects (Appendix 8 and Chapter 10 Landscape and Visual Effects, respectively). As outlined above in paragraph 13.4.39, the potential significant impacts in respect to such effects is greatest closest to the construction activity. For example, within urban areas, the impact of noise effects may be significant within 545m of construction activity for linear sections of the route, while vibration effects may be significant within 60m (see Table A8.3.6 and A8.3.47-48). These are conservative distances however, as physical features within the urban environment (e.g. streetscapes) will provide local screening to mitigate such effects and reduce the distances within which significant noise and vibration effects may be experienced. Further detail on construction noise and vibration effects within urban areas are provided in Appendix 8.3 Noise and Vibration.

13.4.48 In addition, given the localised impacts on communities in urban areas, there is also the potential for significant effects in terms of community severance and changes in access. The combination of these effects is anticipated to contribute to the potentially significant community disruption to communities in urban areas. Therefore, the consideration of such effects in urban areas has been scoped into the 'People and Communities' assessment.

13.4.49 There are 38 schools within the LAI of Sections D to H (see paragraph 13.3.12), all of which are anticipated to experience potentially significant adverse effects in line with those outlined above. Eight schools (Farnborough Hill School, Henry Tyndale School, Salesian School, Philip Southcote School, The Matthew Arnold School, Clarendon Primary School, Thomas Knyvett College and St James Senior Boys School) are expected to be directly affected by the construction of the Project as they are situated within the Order Limits.

Operation

13.4.50 The Project is not expected to present any potential for significant effects in terms of air quality, traffic, noise, vibration, or visual impacts on communities in rural or urban areas during the operational phase.

13.4.51 Consideration of effects from disruption during operation in rural and urban areas (including schools) have therefore been scoped out of the 'People and Communities' assessment (Planning Inspectorate Advice Note 7 questions 1 and 3).

13.4.52 There is also not anticipated to be any community severance or change in access to local communities in rural or urban areas during the operation of the Project, as the pipeline would be situated underground.

13.4.53 Consideration of effects of severance during operation on local communities in rural and urban areas have been scoped out of the 'People and Communities' assessment (Planning Inspectorate Advice Note 7 question 1).

Public Safety

Construction

13.4.54 In the absence of adequate security, construction sites can attract theft and other crimes. In addition, there can be a perception that the influx of a transient workforce may lead to an increase in petty crime.

13.4.55 Chapter 4 sets out the expected security for pipeline construction; these measures will reduce the risk of crime at the construction locations, both rural and urban.

Rural Areas

13.4.56 With regards to public perception of a potential increase in crime or a public safety issue brought on by the Project, the short term nature of construction (covering 450m of pipeline per week) and the small number of workers (likely maximum of 80 workers per section) makes this less likely and not expected to be significant.

Urban Areas

13.4.57 Construction within urban areas is expected to progress along the length of the route at a slower rate than in rural areas, at a rate of 90m per week, with a likely maximum of 60 construction workers per section. A significant effect relating to public perception of a potential increase in crime or a public safety issue brought on by the Project is not anticipated.

13.4.58 Due to site security measures, the modest duration of construction and number of workers associated with the construction of the Project in rural and urban areas, no significant effects on public safety (including public perception) are expected. As a result, the consideration of potential effects on public safety has been scoped out of the 'People and Communities' assessment (Planning Inspectorate Advice Note 7 question 3).

Operation

13.4.59 The replacement pipeline would be situated underground and operated by an existing workforce during its operation. In addition, the Esso Fawley site directly employs over 1,000 people, with many more employed within the supply chain. These jobs are expected to be safeguarded during operation, with most workers assumed to already reside within local communities. No potential changes to public safety (including public perception) are anticipated. On this basis, potential effects on public safety (including the public perception of an increase in crime) during operation have been scoped out of the detailed 'People and Communities' assessment (Planning Inspectorate Advice Note 7 question 1).

13.4.60 It is recognised that there is a need to understand the perception of safety during operation of the pipeline. The risk of a major accident during both construction and operation of the pipeline is addressed in Chapter 15. The Pipelines Safety Regulations (1996) is the key legislation for the Project, and the pipeline will be designed to comply

with it. Chapter 15 uses COMAH guidance to consider the risk of a major accident event on people and the environment. In a precautionary approach, it scopes certain topics in for further assessment in the Major Accidents chapter of the ES, including the risk of fire in the proximity of AGIs. Compliance with the Pipelines Regulations is expected to reduce or avoid public concerns relating to safety during pipeline operation, and further consideration of this topic within the 'People and Communities' assessment is scoped out.

13.5 Impact Assessment Methodology

13.5.1 There is no published technical guidance available for assessing and evaluating socio-economic effects within the context of an EIA. Therefore, the 'People & Communities' assessment would follow the general approach set out in Chapter 6 Impact Assessment Methodology, as outlined below.

Baseline Information Requirements for Detailed Assessment

13.5.2 While the majority of the data required for a detailed 'People and Communities' baseline are publicly available, some additional data (i.e. Experian business data) may be purchased as appropriate to further inform the baseline and the subsequent impact assessment within the ES. A site visit with supplementary walk-over of specific locations along the route will take place before the detailed assessment is undertaken. This site visit will be used to verify information collated by the desktop study. Points of interest include the location of the route, local communities and sensitive receptors within these, as well as the location and nature of (tourism attractions and tourist accommodation in close proximity to the Project.

Value or Sensitivity of Receptors

13.5.3 The value of receptors may be considered a function of their sensitivity to an effect. However, it can also relate to the overall value of the receptor to social or economic needs, for example, the labour market to the economy.

13.5.4 A value or sensitivity for receptors would be defined based on Table 13.4:

Table 13.4: Criteria for determining the value/sensitivity of 'People and Communities' receptors

Value/Sensitivity	General criteria
High	The receptor or effect category is identified as a priority in relevant policies. There is evidence that this receptor or subtopic faces major socio-economic challenge or underperforms, or there is vulnerability in the study area.
Medium	The receptor or effect category is not identified as a priority in relevant policies. There is evidence of considerable socio-economic challenge or underperformance and vulnerability for this receptor or subtopic.
Low	The receptor or effect category is not identified as a priority in relevant policies. There is evidence that this receptor or subtopic is resilient, and there are no identified weaknesses or challenges in the study area.
Negligible	The receptor or effect category is not identified as a priority in relevant policies. There is evidence that this receptor or subtopic currently performs well, with no weaknesses or challenges in the study area.

13.5.5 Table 13.5 presents the sensitivity of each receptor being considered under each

assessment matter.

Table 13.5: Sensitivity ranking according to assessment topic

Assessment matter	Receptor	Value/Sensitivity	Explanation
Employment	Labour market	Medium	National and local policies (Section 13.2) outline key policies in respect to job creation. There is considerable existing employment in the counties, particularly in the construction industry. Therefore, the labour market would not be considered highly sensitive to the employment requirements of the Project.
Economy	Supply chain	Medium	National and local policies (Section 13.2) outline key policies in respect to the economy. It is acknowledged that the economies (supply chains) of both counties already benefit from considerable growth and activity, indicated by the growing number of businesses in both Hampshire and Surrey. Therefore, the local and national supply chains are not considered highly sensitive to impacts of the Project.
Tourism	Tourism receptors: tourism attraction; tourist accommodation; events and associated visitor behaviour	High	Tourism receptors (tourism attractions, tourist accommodation, and events) are considered highly sensitive to potential effects of the Project which could also have a knock-on effect on associated visitor behaviour. These businesses are considered highly sensitive as they are used by local residents and visitors.
	Accommodation stock	Medium	The availability of suitable accommodation is a concern for any workforce in order to live within reasonable distance of the work location. Given that room occupancy in the South East was 68% in 2017 and bedspace occupancy was 50%, accommodation stock is considered to be of 'medium' sensitivity.
	Tourism sector	Low	Tourism is cited within the Local Plans and considered a key component of the economies of both counties. The SDNP is crossed by the Project. The local economies are however not wholly or fundamentally reliant on the tourism sector, contributing just over 1% to the economy of the South East. Given the proportionate size of the tourism sector relative to the economy of the South East, the tourism sector within Hampshire and Surrey is considered to be of 'low' sensitivity.

Assessment matter	Receptor	Value/Sensitivity	Explanation
Effects on communities	Local communities	High	Communities form the basis of society where people predominantly work, socialise and play. For this reason, community areas present a greater potential for impacting the local population. Therefore, local communities are considered highly sensitive.
	Schools	High	Schools are a centre for education and activities for young children and teenagers. Significant disruption to these receptors could affect the ability of their students to learn.
Public safety	Local communities	High	Public safety concerns the potential change in public safety, including the perception of a possible increase in crime. As communities form the basis for society, local communities are considered highly sensitive.

Magnitude of change

13.5.6 The magnitude of change represents the scale or extent of the change from the baseline conditions, arising as a result of the Project.

13.5.7 Due to the complexity of the change under consideration, it is not appropriate to create a definitive magnitude criterion for each assessment topic. Therefore, magnitude of change is not assessed on the basis of set criteria definitions (for example, an increase of 10% in employment is either a 'small' or a 'large' magnitude of change)

13.5.8 The assessment for 'People and Communities' effects is based on setting the change in the context of the baseline and using professional judgement as required.

13.5.9 Magnitude of change is described as Negligible, Small, Medium or Large in accordance with the generic criteria set out in Chapter 6 Impact Assessment Methodology.

Assessment of Significance

13.5.10 The assessment of the significance of a 'People and Communities' effect considers the following key factors:

- the sensitivity/value of receptors; and
- the magnitude of change from the baseline condition, which, in turn, includes consideration of the following:
  - the duration and reversibility of the effect (where relevant);
  - the capacity of the local area to absorb the effect; and
  - recent rates of change in the locality.

13.5.11 Professional judgement and experience are used to support the sensitivity/value and magnitude assessment. The matrix in Chapter 6 Impact Assessment Methodology illustrates the relationship between the value of the receptor under consideration and the magnitude of change it is expected to experience. This is used to determine the significance of the effect on that receptor. Effects are ranked as Negligible, Minor, Moderate or Major. Minor and Negligible effects are considered not significant, while Moderate and Major are considered to represent significant effects.

Mitigation Measures

13.5.12 Embedded and good practice mitigation measures would be incorporated into the design of the Project, and good practice standards will be contained within the CoCP for the construction phase (see Chapter 4 Design Evolution). The consideration of potentially significant 'People and Communities' effects includes the implementation of such mitigation. Where such potentially significant effects have been identified, then additional mitigation would be proposed to reduce these significant effects.

13.6 Summary Scope for the EIA

13.6.1 A summary of the scoping process identified in respect to the 'People and Communities' assessment and as outlined above is provided in Table 13.6 and Table 13.7.

Table 13.6: Matters scoped into the EIA for people and communities during construction

Receptor	Matter / potential effect	Locations	Comments
Employment	Labour market (county-level)	All Sections	Scoped out. No significant effects are anticipated given the limited number of direct job opportunities associated with construction.
Economy	Local and national supply chains	All Sections	Scoped out. No significant effects are anticipated given the considerable growth of businesses across the counties.
Tourism	Tourism receptors: tourism attractions; tourist accommodation; events and changes in associated visitor behaviour	Sections A, B and C (Rural)	Scoped in. Potential significant noise, vibration, visual effects.
		Sections D to H (Urban)	Scoped in. Potential significant noise, vibration, visual and traffic effects.
	Accommodation stock	All Sections	Scoped out No significant effects are anticipated on worker accommodation.
	Tourism sector	All Sections	Scoped in. Potential significant effects identified with respect to tourism attractions, accommodation, events and associated visitor response resulting in a combined adverse effect on the tourism sector.
Effect on communities	Local communities	Sections A, B and C (Rural)	Scoped in for distances shown in Tables A8.3.6 and A8.3.7 in Appendix 8. There is the potential for significant noise, vibration and visual effects in rural areas.
		Sections D to H (Urban)	Scoped in for distances shown in Tables A8.3.6 and A8.3.7 in Appendix 8. Potential significant noise, visual and traffic effects. In addition, significant effects in terms of community severance and

Receptor	Matter / potential effect	Locations	Comments
			changes in access are also anticipated in urban areas.
	Schools	Sections A, B and C (Rural)	Scoped in for distances shown in Table A8.3.6. There is the potential for significant noise, vibration and visual effects on schools in rural areas.
		Sections D to H (Urban)	Scoped in for distances shown in Table A8.3.6. Potential significant effects from noise and vibration, visual and traffic effects. In addition, potential significant effects from severance and change in access.
Public safety	Local communities	All Sections	Scoped out No significant effects are anticipated on crime levels and the public perception of an increase crime.

Table 13.7: Matters scoped into the EIA for people and communities during operation

Receptor	Matter / potential effects	Locations	Comments
Employment	Labour market (county-level).	All Sections	Scoped out No significant effects are anticipated on employment.
Economy	Local and national supply chains.	All Sections	Scoped out No significant effects are anticipated on the local and national supply chains.
Tourism	Tourism receptors: tourism attractions; tourist accommodation; events and changes in associated visitor behaviour	All Sections	Scoped out No significant effects are anticipated on tourism receptors.
	Accommodation stock	All Sections	Scoped out No significant effects are anticipated on worker accommodation.
	Tourism Sector	All Sections	Scoped out

Receptor	Matter / potential effects	Locations	Comments
			No significant effects are anticipated within the tourism sector.
Effect on communities	Local communities	All Sections	Scoped out No significant noise, vibration and visual effects are anticipated. In addition, no potential effects in terms of community severance and changes in access are anticipated.
	Schools	All Sections	Scoped out No significant noise, vibration, visual or traffic effects are anticipated in rural or urban areas. In addition, no potential effects in terms of community severance and changes in access are anticipated.
Public safety	Local communities	All Sections	Scoped out No significant effects are anticipated on crime levels and the public perception of an increase in crime. No significant effects are anticipated regarding public perception of major accident risk.

Chapter 14
Health Impacts

Scoping Report Volume 1

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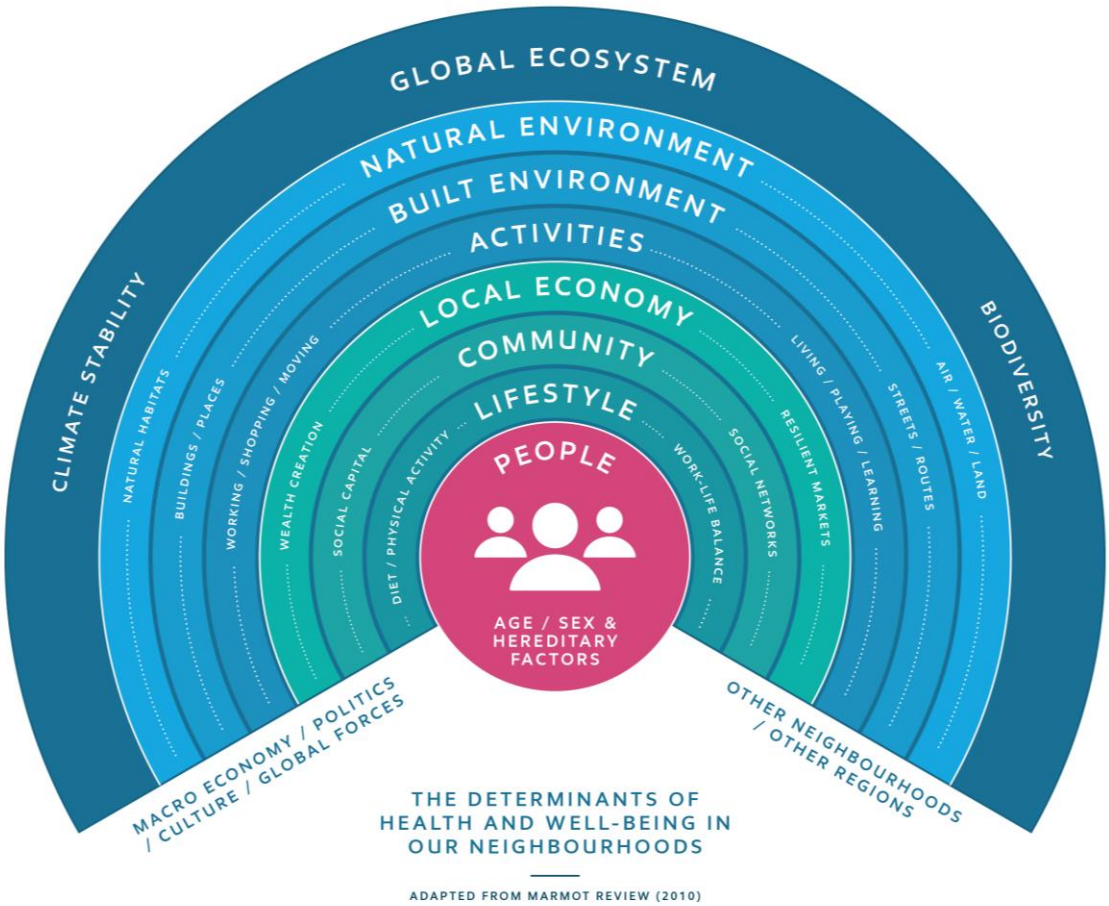
14. Health

14.1 Introduction

14.1.1 Human health is defined by World Health Organisation (WHO, 1984) as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”. For the purposes of the Project, health includes physical and mental health and the broader concept of well-being as stated in the Marmot Review (2010). This is illustrated in Figure 14.1.

14.1.2 Chapter 14 was written by a technical expert in the field of socio-economics who is currently employed by Jacobs. She has 16 years’ experience in the consultancy sector, as well as two years in industry and two years in academia. Her qualifications are BEng (First Class Hons) in Environmental and Ecological Engineering and an MPhil in Engineering & Design. She is also a chartered member of the Institute of Water and Environmental Management (MCIWEM) and a Chartered Environmentalist (CEnv).

Figure 14.1: The determinants of health and well-being in our neighbourhoods (Marmot Review, 2010)



14.2 Legal and Policy Requirements

Policy

National Policy Statement for Energy (NPS) EN-1 and EN-4

14.2.1 EN-1 sets out the policy for delivery of major energy infrastructure. It states that where the Project has an effect on human beings, the Environmental Statement (ES) should assess these effects for each element of the project, identifying any adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate. Direct impacts on health may come from increased traffic, air or water pollution, dust, odour, hazardous waste and substances, noise, exposure to radiation; and an increase in pests.

14.2.2 EN-1 also states that cumulative health impacts should be considered.

14.2.3 Whilst EN-1 and EN-4 remain the prime decision making documents, where they do not provide guidance, the following may also be considered important and relevant guidance that may require consideration by the decision making authority. At this stage it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State and it is included for completeness to allow the Secretary of State to make such a determination. In considering these policies it should be noted that the Local Authorities and SDNPA are not the decision maker for the Project

National Planning Policy Framework (NPPF)

14.2.4 The NPPF supports the role of planning. It aims to create healthy, inclusive communities by supporting local strategies to improve health, social and cultural well-being for all (MHLG, 2012).

Local plans and policies

14.2.5 Appendix 2 identifies the relevant local policies for the project that are key to delivering sustainable development outcomes that reflect the visions and aspirations of local communities. They include various policies that promote healthy lifestyles, improved wellbeing and quality of life. These include requirements for developments to provide green infrastructure, opportunities for physical activity, opportunities for recreation and social interaction, and to support rural services.

14.3 Baseline conditions

Study Area

14.3.1 The study area(s) for the health assessment is defined by the scope of the relevant topic study areas. Consistent with Chapter 13 People and Communities, baseline data are provided for the counties of Surrey and Hampshire only.

14.3.2 The Project is situated within Hampshire and Surrey, with the exception of a short distance (up to 60m) within Esso's West London Terminal storage facility within the London Borough of Hounslow and the administrative area of the Greater London Authority (GLA). As the Project does not directly impact land outside Esso's facilities within the London area and it is not characteristically different to that which exists in Surrey, the London area is not explicitly presented in the baseline.

General Health

14.3.3 Public Health England (2017) provides information across a range of health and well-being themes. Further data on population statistics and community health profiles for Surrey and Hampshire can be found online using the Public Health England website. The list below provides a brief summary of the local health profile:

- Overall, the counties of both Hampshire and Surrey are considered to be amongst the healthiest areas in England. Both counties were ranked in the top 15 of 150 local authority areas in the country during the period between 2014 and 2016 (Hampshire was ranked 15th, Surrey 13th).
- Both Hampshire and Surrey are within the 20% least deprived counties in England, with less than 1% of Lower Super Output Areas (LSOAs) in each county within the most deprived 10% nationally.
- Life expectancy rates in both Hampshire and Surrey are similar. Men and women are expected to live for 81.1 and 84.3 years respectively in Hampshire, and 81.7 and 84.6 years respectively in Surrey. These rates are higher than the national average of 79.5 years for men and 83.1 years for women.
- In Hampshire, life expectancy is 6.5 years lower for men and 4.9 years lower for women in the most deprived areas than in the least deprived areas. In Surrey, life expectancy is 5.9 years lower for men and 4.8 years lower for women in the most deprived areas, compared to the least deprived areas.
- Death rates in Hampshire are significantly lower than the rest of England. The main causes of death in Hampshire are cancer, cardiovascular disease and respiratory disease. The area of Gosport, within Hampshire, has significantly higher premature death rates compared to the rest of England.
- The main causes of death in Surrey are cancer and circulatory diseases. The deaths from circulatory disease in Surrey are significantly lower than the national average.
- In both Hampshire and Surrey, the number of people killed and seriously injured on the roads is above the regional and national average.

Mental Health and Well-being

14.3.4 According to the Joint Strategic Needs Assessment (JSNA), one in four adults in

Hampshire experience mental ill health. Evidence shows that people with mental ill health are twice as likely to have serious physical illnesses (JSNA, 2017).

14.3.5 A recent survey found 10.4% of people in Hampshire reported having anxiety or depression, while approximately 10,339 people were registered as having a serious mental illness (Hampshire JSNA, 2017).

14.3.6 In Surrey, since 2000, approximately one in four adults have been diagnosed with mental ill health, similar to the rate in Hampshire. Between January and March 2016, anxiety was the main reason for referrals to the county's Mental Health services (38%). However, overall measurements show levels of anxiety are similar to the average for England (Surrey County Council, 2017).

14.3.7 Overall levels of self-reported well-being are 'good' in Surrey, with lower numbers of residents reporting a low life satisfaction and happiness score compared to the national picture (Public Health England, 2017).

14.4 Likely Significant Effects

14.4.1 Effects are considered in relation to the baseline data presented in the previous section. The health assessment draws on the potential for significant effects concluded within the other chapters and technical notes, specifically Appendix 8, of this scoping report and considers the likely overall extent of effects on health. Where effects are considered not significant and all effects are scoped out, such as effects relating to air quality, these are not taken into account when considering the effects on health.

14.4.2 Direct effects on health can occur from sources of pollution such as noise (e.g. sleep disturbance), and traffic (e.g. driver stress). Indirect effects on health can also arise. For example, disruption to communities from increased traffic can result in reduced community interaction (direct effect), which can have an adverse effect on well-being (indirect effect). Similarly, a change in levels of happiness or change in levels of stress (indirect effect) can result from, perceived or real, direct and prolonged environmental effects.

14.4.3 Key sources of information used to assess overall effects on health are presented in Table 14.1 below. Any gaps in information on health determinants not covered by other assessment topics, are also identified.

14.4.4 Matters assessed in Chapter 12 Land Use, Chapter 7 Biodiversity, and Chapter 9 Historic Environment are not included in Table 14.1. This is because it is considered that any health effects resulting from these environmental effects would not be significant in the context of public health.

Table 14.1 Sources of information used to assess overall effects on health

Key health determinants	Source of information	Potential health impacts/concerns
Disruption to green space and nature	Chapter 10 Landscape and Visual, and Chapter 13 People and Communities	Severance to green space could result in a number of adverse health effects including reduced physical activity, increased levels of heart disease and stress, increased risk of stroke and mental health problems.
Effects on communities	Chapter 13 People and Communities	Major construction works can disrupt social networks. This could result in adverse health effects, through the creation of barriers. These can prevent or reduce community interaction, and reduce, or change access to amenity therefore influencing people's perception of an area.
Traffic, transport, connectivity, severance and physical injury from accidents.	Traffic and Transport Technical Note (Appendix 8)	Should driver stress arise despite traffic management during construction, fear of accidents and frustration may have negative effects on mental well-being.
Soil contamination	Chapter 11 Land Quality	The potential disturbance of contaminated soil during construction could have negative

Key health determinants	Source of information	Potential health impacts/concerns
		effects on health if contaminants enter the blood stream. There is also a risk of suffocation, choking or physical injury to workers should there be a build-up of ground gases, e.g. from migration of landfill gas.
Noise and Vibration	Noise and Vibration Technical Note (Appendix 8)	High levels of noise and vibration could result in adverse health effects such as sleep disturbance, impaired communication, increased aggression, cardiovascular and psycho-physiological effects.
Water	Chapter 8 Water	Potential effects on health from contaminated water sources might include diseases such as hepatitis and dysentery.
Major accidents	Chapter 15 Major Accidents	The human population could potentially be vulnerable to fire in the event of a major accident.
Community well-being	Chapter 4 Design Evolution, and Chapter 13 People and Communities	Potential effects on community well-being from the perception of activity associated with the construction and operation of the Project.

14.4.5 Consideration is given to the mitigation and control measures outlined in Chapter 4 Design Evolution when assessing the potential for effects on health. Mitigation and control measures outlined in Chapter 4 will form an essential part of the Code of Construction Practice (CoCP) established for construction. An outline CoCP is presented in Appendix 1.

14.4.6 Decommissioning activities would be subject to an appropriate decommissioning strategy. It is not practical to assess the effects of decommissioning at this stage as the methodology and good practice mitigation measures will not be defined until closer to the time, likely to be at least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

Disruption to Green Space and Nature

Construction

14.4.7 A review led by the Forestry Commission found that providing secure, convenient and attractive green space can lead to more physical activity (Croucher and Bretherton, 2007). This reduces levels of heart disease, strokes and other ill-health problems that are associated with both sedentary occupations and stressful lifestyles (Croucher and Bretherton, 2007). Similarly, there is growing evidence to suggest that access to parks, open space and nature can help maintain or improve mental health (Natural England, 2010).

14.4.8 As reported in Chapter 10 Landscape and Visual during construction, significant visual effects may occur from nearby viewpoints of medium to high sensitivity. This includes:

a section of the South Downs Way National Trail and parts of other promoted long distance paths (Figure 13.5), public parks, areas of common land, school grounds, golf courses and residential properties. Similarly, during construction, there could be adverse effects on landscape character in areas with extensive loss of vegetation or within locally designated landscapes. These effects may continue for some time following completion of construction, as replacement vegetation becomes established.

14.4.9 During the construction phase, the remaining areas of green space close to the works could be subject to temporary amenity impacts, changes in access and severance issues which may affect their quality and desirability. This disruption could result in a decrease in users and an associated drop in the positive health effects linked to access to green space and nature. For example, users may experience a decrease in levels of physical activity, increased stress and negative mental health effects.

14.4.10 On completion of pipeline construction, there is potential for areas of green space close to the works to continue to be subject to short term amenity impacts due to visible bare earth and reduced vegetation cover while new planting becomes established. This could affect their quality and desirability.

14.4.11 The contractor will be required to implement appropriate measures to mitigate the visual and landscape impacts of the construction works, for example, to reduce the loss of characteristic landscape features the contractor would retain and protect trees and existing vegetation within and adjacent to the Order Limits wherever possible. Such measures would be set out and secured through the CoCP, contractors' CEMP, and the Register of Environmental Actions and Commitments (see Chapter 4 Design Evolution).

14.4.12 It is considered that these measures would be sufficiently robust to mitigate any significant impact on health resulting from landscape and visual effects.

14.4.13 As reported in Chapter 13, People and Communities, there are a number of publicly accessible land (such as parks, moors, heaths and downs) that are intersected by the Project (i.e. Chobham Common National Nature Reserve (Section F), Chertsey Meads Local Nature Reserve (Section G), and Queen Elizabeth Park in Farnborough (Section E)). As there are other, smaller, pockets of publicly accessible land located throughout the length of the Project, therefore it is considered that the availability of alternative green spaces would be sufficient and will provide suitable alternatives for the local communities that are affected by the Project.

14.4.14 It is therefore considered that due to the availability of alternative green space and areas of nature, the impact on health as a result changes in access to green space is unlikely to be significant and is therefore scoped out of the EIA (Planning Inspectorate Advice Note questions 3 and 5).

Operation

14.4.15 As the pipeline is situated underground during its operation, there is no potential for health impacts to occur. This topic is therefore scoped out of the EIA (Planning Inspectorate Advice Note questions 3 and 5).

Effects on Communities

14.4.16 Chapter 13 People and Communities considers the findings of the landscape and visual chapter (Chapter 10) as well as the technical notes (Appendix 8) covering traffic and transport, noise and vibration. It considers the overall extent of the effects on

people and communities, including the potential for effects on tourism (examining individual receptors and the sector as a whole), economy, employment as well as public safety. The findings in chapter 13 are reviewed in this chapter to identify the potential for significant effects on health (and well-being) in respect to the above areas.

14.4.17 To avoid duplication or double counting of effects, potential effects on health from traffic and transport, noise and vibration, and landscape and visual are also considered on an individual basis in this chapter.

Construction

14.4.18 Construction works, such as those associated with the Project, can disrupt social networks through the creation of barriers. These barriers can prevent or reduce community interaction. This disruption can result in health effects such as increased levels of stress and feelings of isolation within a community.

14.4.19 As reported in Chapter 13 People and Communities there is the potential for significant effects on communities during construction from disruption caused by noise, vibration and visual effects. This is because works in urban areas are anticipated to be predominantly located along roadways, and therefore in close proximity to a large number of sensitive receptors.

14.4.20 There would therefore be the potential for an impact on human health as a result of community disruption. However, since there is no direct impact pathway, this effect is scoped out of the health assessment and will be further analysed as part of the 'people and communities' assessment (Chapter 13) (Planning Inspectorate Advice Note 7 Question 1).

Effects from community disruption are scoped out of the health assessment.

Operation

14.4.21 As outlined in Chapter 13 People and Communities, no significant effects on communities are expected during operation as the pipeline would be situated underground (Planning Inspectorate Advice Note 7 question 1).

Traffic, Transport, Connectivity, Severance and Physical Injury from Accidents

Construction

14.4.22 Potential physical and mental health effects associated with transport include changes in the level and risk of road accidents, stress levels experienced whilst travelling and the resulting health effects (e.g. cardiovascular problems), and effects caused by changes in levels of social contact (due to severance).

14.4.23 Driver stress is defined as "the adverse mental and physiological effects experienced by a driver traversing a road network" (DMRB, 1993). The three main parts of driver stress are:

i) frustration;

ii) fear of potential accidents; and

iii) being uncertain of the route.

14.4.24 These components could equally apply to pedestrians, cyclists and equestrians.

14.4.25 During construction, no significant traffic effects are expected for rural communities

(Appendix 8). Therefore, the assessment of traffic and transport on human health in rural areas is scoped out and would not be assessed in the EIA (Planning Inspectorate Advice Note 7 question 1).

14.4.26 In urban areas, as traffic flows are higher, temporary road closures and traffic management will be required during construction to enable pipeline construction. Appendix 8 states that this has the potential to result in increased congestion, increased journey times and increased incidents of drivers following unfamiliar routes. All of these factors could contribute towards driver stress.

14.4.27 Appendix 8 also highlights the potential for significant effects from severance and pedestrian delay. Community severance is defined as the separation of residents from facilities and services they use within their community caused by new or improved roads or by changes in traffic flows, and is assessed on roads with an existing annual average daily traffic flow of over 8000 vehicles (DMRB, 1993). Severance could result in reduced access to community facilities including health care and basic facilities.

14.4.28 However, with the implementation of good practice traffic management measures and controls (see Chapter 4 and Appendix 8), no significant residual transport effects would be expected.

14.4.29 Examples of mitigation measures include requirements on contractors to produce a Construction Traffic Management Plan (CTMP) in consultation with the relevant highway authorities and emergency services which will consider the traffic generated by the construction vehicles, as well as managing diversions and closures due to works within the highway network.

14.4.30 It is considered that these measures would be sufficiently robust to mitigate any significant impact on health resulting from driver stress or severance in urban communities during construction. Therefore, the assessment of traffic and transport on human health in urban communities is scoped out and would not be assessed in the EIA (Planning Inspectorate Advice Note 7 question 5).

Effects from traffic and transport related issues within rural and urban areas are scoped out of the health assessment.

Operation

14.4.31 No significant traffic effects are expected during operation as the Project will be situated underground. Therefore, the consideration of such effects on health during operation are scoped out and will not be assessed in the EIA (Planning Inspectorate Advice Note 7 question 1).

Soil contamination

Construction

14.4.32 The World Health Organisation (2012) states that contaminated land ‘might threaten human health and the environment, by altering air quality, hampering soil functions, and polluting groundwater and surface water’.

14.4.33 Soils can enter the human body via three main routes: eating, inhalation (breathing in) and dermal absorption (through the skin). Once in the body, dangerous chemicals within the soil are absorbed into the bloodstream leading to a range of health effects. The chemicals of major public health concern are listed by the World Health

Organisation as mercury, lead, fluoride, dioxin, hazardous pesticides, cadmium, arsenic, asbestos and benzene (WHO, 2010).

14.4.34 Each chemical has unique effects on human health. For example, the absorption of lead into the bloodstream can result in neurological damage, kidney disease and bone deterioration. Similarly, the absorption of arsenic, which is widely distributed throughout the earth's crust, can lead to diseases such as diabetes, cancer and cardiovascular diseases (WHO, 2010).

14.4.35 Similarly, if risks are not adequately assessed and managed, a build-up of migrating gases from landfills could result in explosion or asphyxiation causing suffocation, choking or physical injury.

14.4.36 The existence of many exposure pathways together with the fact that many industrially contaminated sites are located close to urban areas, could result in significant effects on human health (WHO, 2012).

14.4.37 As reported in Chapter 11 Soils and Geology potential health effects are possible for construction workers from contaminated soils on landfill sites during construction. This could be through direct contact, ingestion, skin contact or the breathing in of contaminated dust. Similarly, soil particles could be transported by wind to local receptors, such as residents, living close to the Order Limits.

14.4.38 The significance of the effect related to land contamination would depend on the nature and character of the contamination, the size of the contaminant source and the presence of sensitive receptors. However, with the good practice management measures and controls which will be secured through the CoCP (see Chapter 4), no significant residual effects are expected.

Effects from soil contamination are scoped out of the health assessment.

14.4.39 Examples of mitigation measures include, but are not limited to, requirements on the contractor to produce a CEMP which will outline suitable measures to reduce the risk of a pollution incident occurring, as well as pro-active actions to ensure that any pollution incident that does occur is controlled and managed effectively to avoid or reduce adverse impacts on the environment (see Chapter 4).

14.4.40 It is considered that these measures are sufficiently robust to mitigate any significant impacts on health as a result of land contamination. Therefore, the consideration of effects of contaminated land on human health is scoped out and will not be assessed in the EIA (Planning Inspectorate Advice Note 7 question 5).

Operation

14.4.41 During operation, no significant land quality effects are expected. Therefore, operational effects of land quality on health is scoped out and will not be assessed in the EIA (Planning Inspectorate Advice Note 7 question1).

Noise and Vibration

Construction

14.4.42 Evidence from the World Health Organisation suggests that high levels of noise nuisance and vibration caused by traffic and construction activities could have adverse effects on health (WHO, 1999). For example, excessive noise and vibration can result in sleep disturbance and increased aggression. The extent of the noise effect depends

on the type of construction work undertaken, the duration of the work and the environment in which the works are taking place (i.e. rural or urban environment).

14.4.43 As reported in Appendix 8, for construction during normal working hours, there is potential for significant effects to occur at residential receptors up to 85m from the Order Limits. If construction takes place outside of normal working hours, there is potential for significant effects at the most sensitive receptors up to 1100m from the Order Limits during the noisiest activities (these are estimated distances based on a conservative assessment for the purposes of scoping). This could result in significant sleep disturbance effects.

14.4.44 Effects from vibration are only expected to be significant within a maximum distance of 60m from the Order Limits as outlined in Appendix 8.

14.4.45 However, due to the noise mitigation measures and controls outlined in Chapter 4, no significant noise and vibration effects are expected during construction.

14.4.46 Examples of mitigation measures could include control at the source (e.g. the selection of quieter equipment), control of working hours and possibly the provision of hoarding around a construction compound.

14.4.47 It is considered that these mitigation measures would be sufficient to mitigate any significant impacts on health as a result of noise and vibration effects. Therefore, the consideration of noise and vibration on human health is scoped out and will not be assessed in the EIA (Planning Inspectorate Advice Note 7 question 5).

Effects of noise and vibration are scoped out of the health assessment.

Operation

14.4.48 During operation, no significant noise and vibration effects are expected (Appendix 8). Therefore, effects of noise and vibration on health during operation are scoped out and will not be assessed in the EIA (Planning Inspectorate Advice Note 7 question 1).

Water

Construction

14.4.49 The damaging consequences of flooding could have lasting impacts on health and well-being. Studies have shown that stress, caused by loss of property, possessions and memorabilia, can continue for a long time after the water has receded (WHO, 2013). Other health effects include injuries and illness, anxiety caused by being in a flood and disruption to healthcare services. In extreme cases, high volumes of flood water can result in fatalities (WHO, 2013).

14.4.50 As reported in Chapter 8, there is potential for temporary loss of floodplain storage where the construction works coincide with Flood Zone 3 and areas at high risk of surface water flooding. For example, construction of temporary haul roads at trenchless crossing points could make the ground less permeable, increasing runoff volumes and consequently flood risk. Similarly, construction activities could divert existing flood pathways, exposing new areas to flooding.

14.4.51 Whilst there is potential for health effects from flooding, effects would differ in magnitude and significance according to their location. For example, in rural areas, displaced flood water has the potential to be naturally attenuated by the floodplain downstream and therefore the risk to people is reduced. In line with Flood Risk

Regulations (2009), a flood risk assessment would be prepared for each location to assess the impact on flood risk and identify the mitigation measures necessary to address any increase in risk.

14.4.52 The contractors' CEMP will give details of mitigation measures for all work or compound areas located within flood risk areas, as set out in Chapter 4 Design Evolution.

14.4.53 It is considered that these measures will be sufficiently robust to mitigate any significant impacts on health resulting from flood risk. Therefore, the assessment of flood water on human health is scoped out and will not be assessed in the EIA (Planning Inspectorate Advice Note 7 question5).

Effects on flooding are scoped out of the health assessment.

14.4.54 Disruption or changes to water quality can also result in health effects. Water companies abstract groundwater, treat it, and distribute clean, safe, drinking water to the public. Pollution of groundwater from diffuse sources such as pesticides, hydrocarbons and other chemicals could result in contamination of this supply causing adverse effects on human health. This includes the transmission of diseases such as hepatitis and dysentery and can also result in human poisoning (WHO, 2018).

14.4.55 As reported in Chapter 8 Water, changes to groundwater quality from the removal of vegetation and disturbance of the ground during construction could lead to increased solids in the groundwater. This could result in a reduced quality of groundwater within chalk aquifers as well as water meant for public use. Similarly, Chapter 8 reports that where construction activities would be near or over watercourses, contaminants such as chemicals or suspended sediment could enter the water.

14.4.56 In the UK, tight controls over public water supply (for example, the EU Drinking Water Directive (98/83/EC) (2015), and the UK Water Supply Regulations (2016)) ensure that all water meant for human consumption passes appropriate safety tests.

14.4.57 The CEMP will give details of the location of any known land drainage systems and discharge points likely to be impacted and will set out management measures to address any issues, as set out in Chapter 4.

Effects on water quality are scoped out of the health assessment.

14.4.58 It is considered that these regulations, combined with control and management measures set out in Chapter 4, would avoid or mitigate contamination of water sources, and avoid any related effects on health (Planning Inspectorate Advice Note 7 question 5).

Operation

14.4.59 During operation, no significant effects are expected from water. Therefore, effects of water on health during operation are scoped out and will not be assessed in the EIA (Planning Inspectorate Advice Note 7 question 1).

Major Accidents

14.4.60 The risk of a major accident during both construction and operation of the pipeline is addressed in Chapter 15. The Pipelines Safety Regulations (1996) is the key legislation for the Project, and the pipeline will be designed to comply with it. Chapter 15 uses COMAH guidance to consider the risk of a major accident event on people

and the environment.

Construction

14.4.61 Chapter 15 considers and rejects the possibility of likely significant effects on population and health as a result of a major accident during construction. Health effects arising from a major accident during construction are therefore scoped out and will not be considered within the EIA (Planning Inspectorate Advice Note 7 question 1).

Operation

14.4.62 The potential for an explosion during the operation of the pipeline is not considered credible (see Chapter 15). Aviation fuel is not considered toxic to humans.

14.4.63 Therefore, a major accident during operation could represent a potential risk of fires which could result in health effects such as serious burns or reduced lung function as a result of smoke inhalation. These effects would vary significantly in scope and nature depending on the scale or context of the accident.

14.4.64 As reported in Chapter 15, the risk of Major Accident Events (MAEs) arising from the operation of the Project relate to the potential loss of containment of aviation fuel at locations above ground.

14.4.65 In order to further evaluate the likely risks to human health, consequence modelling will be completed using industry standard modelling software as part of the MAEs assessment to be reported in the ES. This would be used to assess to assess the effects on health.

Effects of aviation fuel release on health is scoped out of the assessment and will be considered within Major Accidents.

14.4.66 Without consequence modelling it is not possible to state the extent of the consequences for releases of aviation fuel. Therefore, the impact of such effects on health is scoped out of the health assessment (Planning Inspectorate Advice Note 7 question 1), however it will be considered as part of the EIA of major accidents in the ES.

Community Well-being

14.4.67 There is a potential for effects on community well-being as a result of the Project. This results mainly from the perception of significant adverse effects. Issues surrounding perception of danger and threats to personal safety could give rise to increased levels of stress and anxiety. There could also be other perceptions, for example, that increased traffic congestion could prevent use of local services and community facilities.

14.4.68 Chronic stress, which occurs when stress lasts for a long time, can affect normal human bodily functions such as the immune system, digestive system, sleep and reproductive systems. Over time, continued stress could result in serious health problems, such as heart disease, high blood pressure, diabetes, and other illnesses, as well as mental disorders like depression or anxiety (National Institute of Mental Health, 2018).

14.4.69 A study by Fahlbruch (2012) found that the perceived risk of pipeline projects is often caused by differences between the public's perception or understanding of risk and that of experts. This can be caused by a lack of information, a feeling of being threatened by new projects and differences in public responses to subjective and

measureable risk.

14.4.70 While no significant effects on public safety are anticipated or reported in Chapter 13 People and Communities, the contractor will be required to prepare a Community Engagement Plan that will ensure that the local communities throughout the Project are given adequate information about construction activities within their local area (see Chapter 4).

14.4.71 It is considered that these measures would be sufficient to mitigate any effects on well-being resulting from public perception of adverse effects. Indirect effects on health (well-being effects) are unlikely over and above the direct health effects considered throughout this chapter. Therefore, the assessment of well-being effects during construction and operation is scoped out and would not be assessed in the EIA (Planning Inspectorate Advice Note 7 question 5).

Effects on well-being are scoped out of the health assessment.

14.5 Summary Scope for the EIA

14.5.1 The potential effects identified in respect to the health assessment, as outlined above, are provided in the table below. No significant effects on human health (and well-being) are anticipated during the construction or operation of the Project. With the exception of the health effects considered in Chapter 15 Major Accidents, all consideration of potential effects on human health (and well-being) are scoped out of the EIA.

Table 14.2 Matters of significance for health

Receptor	Matter / potential effects	Locations	Comments
Disruption to green space and nature	Construction activities resulting in loss of green space used for physical activity and stress relief.	All green spaces where loss of vegetation causes reduced amenity.	Scoped out as people have access to alternative areas of green space (Planning Inspectorate Advice Note 7 question 5).
Disruption to green space and nature	Visual amenity during and beyond construction, resulting in reduced use of green space for physical activity and stress relief.	Locations where loss of vegetation causes reduced amenity.	Mitigation measures would be sufficient to mitigate any effects on health (Planning Inspectorate Advice Note 7 question 5).
Effects on communities	Disruption to communities causing decreased social cohesion and associated negative effects.	All communities within the counties of Surrey and Hampshire with disruption effects.	Scoped out due to lack of direct impact pathway. This will be further considered in the people and communities assessment (Planning Inspectorate Advice Note 7 question 1).
Traffic, transport, connectivity, severance and physical injury from accidents.	Health effects as a result of increased congestion, driver stress and severance.	All locations along the route with potential transport effects.	Scoped out since with the implementation of appropriate traffic management measures and controls, residual effects would be insignificant (Planning Inspectorate Advice Note 7 question 5).

Receptor	Matter / potential effects	Locations	Comments
Soil contamination	Health effects resulting from a build-up of ground gasses and/or soil contamination.	All locations along the route with potential effects from soil contamination and a build-up of ground gasses.	Scoped out since the mitigation measures would be sufficient to mitigate any effects on health resulting from ground gasses or contaminated soil (Planning Inspectorate Advice Note 7 question 5).
Noise and Vibration	Effects as a result of noise disruption, such as sleep disturbance.	All locations along the route with potential noise and vibration effects.	Scoped out since the mitigation measures would be sufficient to mitigate any effects on health resulting from noise and vibration (Planning Inspectorate Advice Note 7 question 5).
Water	Health effects from contamination of groundwater entering public water supplies. Potential health effects from flooding such as stress.	All locations along the route with potential effects on groundwater contamination and flood risk.	Scoped out since the mitigation measures would be sufficient to mitigate any effects on health resulting from groundwater contamination (Planning Inspectorate Advice Note 7 question 5).
Major accidents	Health effects could occur as a result of fires from major releases of aviation fuel.	All locations along the route with potential effects from fire.	Scoped out of the health assessment and to be considered within ES chapter on Major Accidents.
Community well-being	Well-being effects due to public perception of effects.	All communities within the study area.	Scoped out since the proposed measures would be sufficient to mitigate any effects on well-being resulting from public perception of effects (Planning Inspectorate Advice Note 7 question 5).

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Chapter 15
Major Accidents

Scoping Report Volume 1

JACOBS

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15. Major Accidents

15.1 Introduction

15.1.1 This chapter describes the consequence, risk and control/mitigation measures associated with Major Accident Events (MAEs) arising during the construction and operation phases of the Project. There is no specific guidance on the assessment of the potential for major accident hazards for cross country pipelines carrying aviation fuel. As a precautionary approach, techniques developed for the installations which fall within the Control of Major Accident Hazard Regulations 2015 (COMAH) have been applied here. It is important to note that the proposed pipeline does not fall within these regulations, and is not classified as Major Accident Hazard Pipeline (MAHP).

15.1.2 The requirement for 'Major Accidents' to be specifically considered in Environmental Impact Assessment (EIA) was introduced by the Infrastructure Planning (EIA) Regulations 2017 (the Regulations). The Regulations require the assessment to identify expected significant effects arising from the vulnerability of the proposed development to major accidents or disasters that are relevant to that development.

15.1.3 The design of the pipeline will comply with the Pipelines Safety Regulations 1996 (PSR 1996) which requires the management of potential hazards to reduce accidents and disaster risk to an acceptable level. Further assessment of accidents or disaster risk within the EIA process should largely be unnecessary but the EIA can serve to clarify the mechanisms and design measures included to reduce risk to an acceptable level. It is important to note that the PSR 1996 is the key legislation for the Project with respect to Health and Safety. The pipeline is not a MAHP or a COMAH establishment, however COMAH guidance has been referred to in development of the methodologies for hazard identification and the assessment of major accidents in this Scoping Report.

15.1.4 This Chapter identifies potential MAEs and describes how the risk is to be assessed and managed. Consideration of vulnerability to disasters, including natural disasters, is not separately covered, as such disasters would simply represent additional initiating events of incidents captured in consideration of MAEs. In the context of this Project, MAEs relate to the potential loss of containment and significant release of aviation fuel, leading to serious harm to people and/or the environment.

15.1.5 Lesser consideration within this chapter is given to hazards and risks arising from the temporary storage of diesel for use in construction. Diesel will be stored in relatively low volumes to fuel on-site plant and equipment during the construction phase only. However, the volumes concerned are not sufficient to warrant a detailed assessment (of diesel as a cause of an MAE) and the risk of its release will be controlled through construction management techniques set out within the Construction Code of Practice supporting the Environmental Statement.

15.1.6 Similarly, the potential for an MAE arising from the creation of migration pathways of methane-rich landfill gas as a result of development within (the upper 2m) of historic landfills will be considered only briefly. The age of the waste within the sites underlying the proposed route allied to the superficial nature (near-surface where conditions within waste are aerobic) of the excavation works would support the conclusion of a low likelihood of encountering major sources of methane-rich landfill gas. The works are likely to disturb waste and present some evidence of landfill gas which will assessed through site investigations prior to the works and during the works themselves with control measures implemented within the Construction Code of Practice.

15.1.7 Chapter 15 was written by a technical expert in the field of Health, Safety and

Environmental Risk who is currently employed by Jacobs. He has over 30 years' experience in this subject. He is a Chartered Chemist (1992 to date) and Chartered Member of the Institute of Water and Environmental Management (1995 to 2008) and Associate Member of IEMA 1995 to date.

15.2 Key Legislation, Policy and Guidance

15.2.1 The following legislation, policy and guidance has been used to inform the major accidents scoping study and to assist in the identification of likely significant effects and mitigation.

Legislation

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

15.2.2 The Regulations introduced the requirement for major accidents to be specifically considered in EIA. Under the Regulations, significant effects of major accidents relevant to the Project are to be considered in relation to:

- Population and human health;
- Biodiversity, with particular attention to protected species and habitats;
- Land, soil, water, air and climate;
- Material assets, cultural heritage and landscape;
- Interactions between the above aspects.

The Pipeline Safety Regulations 1996

15.2.3 The Pipeline Safety Regulations defines dangerous fluids under Schedule 2. Aviation Fuel has an auto-ignition temperature at standard temperature and pressure in excess of 200 C and as such is not classified as a dangerous fluid. Under these regulations, the proposed pipeline does not classify as a “Major Accident Hazard Pipeline”.

Policy

15.2.4 Whilst EN-1 and EN-4 remain the prime decision making documents, where they do not provide guidance, the following may also be considered important and relevant guidance that may require consideration by the decision making authority. At this stage it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State and it is included for completeness to allow the Secretary of State to make such a determination.

The Overarching National Policy Statement for Energy (EN-1)

15.2.5 There is no relevant guidance within this NPS on the assessment of Major Accidents for non-COMAH establishments.

The National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)

15.2.6 There is no relevant guidance within this NPS on the assessment of Major Accidents for non-COMAH establishments.

The National Planning Policy Framework (NPPF)

15.2.7 This states that ‘Planning policies should be based on up-to-date information on the location of major hazards and on the mitigation of the consequences of major accidents’.

Government Guidance

15.2.8 No specific UK government guidance was identified on including major accidents within

the EIA process.

Regulatory Guidance

15.2.9 A Major Accident is defined within COMAH as *"an occurrence such as a major emission, fire, or explosion resulting from uncontrolled developments in the course of the operation of any establishment to which these Regulations apply, and leading to serious danger to human health or the environment (whether immediate or delayed) inside or outside the establishment, and involving one or more dangerous substances*".

15.2.10 The term 'Major Accident To The Environment' (MATTE) is used in the UK by the Competent Authorities (the HSE and Environment Agency) and industry to indicate when a major accident has caused or could cause serious harm to the environment.

15.2.11 Planning Inspectorate Advice Note 11 sets out how the Inspectorate works with other public bodies to implement the planning process. Advice Note 11, Annex G describes how the HSE supports the planning process with respect to major accidents. Because of the HSE's knowledge of major accident hazards, the Government has appointed the HSE as the statutory consultee to planning authorities for certain developments. With respect to this project, the HSE is a consultee for scoping regarding the adverse effects that could result from a major accident. Annex G recognises that these might arise either because the development introduces new major hazards, or because an accident at the new development might initiate an existing major hazard at a nearby installation.

15.2.12 Regulatory guidance for COMAH is provided by the HSE guidance note L111. Specific guidance on defining and assessing major accidents is provided by the HSE in the form of "Safety Report Assessment Manuals" (SRAMs) and these have been drawn upon in the development of this Chapter.

15.2.13 The Chemicals and Downstream Oil Industries Forum (CDOIF) Guideline for Environmental Risk Tolerability for COMAH Establishments https://www.sepa.org.uk/media/219154/cdoif_guideline__environmental_risk_assessment_v2.pdf implements the Source – Pathway – Receptor approach to environmental risk assessment. Specifically, it considers the quantity of substance that could be released to a receptor to determine a "specified harm criteria" for that receptor. By considering how long that receptor is likely to take to recover, it can be determined if a MATTE would result from the substance release. Any resulting MATTEs are then risk assessed, examining unmitigated and mitigated likelihoods. This would determine if the occurrence is considered tolerable. To determine potential environmental recovery durations, separate Energy Institute guidance is used.

CDOIF environmental assessment methodology is recognised by Environment Agency and HSE for assessment of Major Accidents.

15.2.14 The HSE has issued a document "Planning Advice for Developments near Hazardous Installations" (PADHI). https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010038/EN010038-000812-Written%20representation%20by%20National%20Grid%20%20appendix%202.pdf, This guidance describes how they make assessments with regard to Land Use Planning and Major Accident Hazard Pipelines and sets safety zones around a development. The Pipeline Safety Regulations define a 'major accident hazard pipeline' as one which *conveys a dangerous fluid and which has the potential to cause a major accident.* Under these regulations neither diesel nor aviation fuel is considered as a 'dangerous fluid'. Consequently, the PADHI guidance would be used

for indicative purposes only, if there is no other suitable guidance.

15.3 Baseline Conditions

Study Scope

15.3.1 The study area for the purpose of this scoping assessment comprises the replacement pipeline route and associated Order Limits as set out in Figures 3.1 and 3.2.

15.3.2 The basis of this scoping exercise is the design as detailed in Chapter 3. The pipeline would be underground, except for above ground installations (AGIs), which are identified as:

- Boorley Green
  - 10" Pipeline Inspection Gauge (PIG) receiver (10") and launcher (12") station
- Various Locations (including Alton Pumping Station)
  - 12" Valves
- West London Terminal storage facility
  - 12" PIG receiving station

15.3.3 The scope of the assessment also considers the embedded mitigation (including the work to inform an inherently safe design) and the iterative process to identifying the location of the valves to reduce effects on sensitive human and environmental receptors (see Chapter 4 Design Evolution).

Desktop Study

15.3.4 To determine an appropriate scope for the Major Accidents assessment, an initial desktop study was undertaken. This provided an initial understanding of the potential risks from significant loss of fuel within the study area of the project. The following resources were used:

- Ordnance Survey mapping;
- Aerial and satellite photographs;
- Project geographical information system (GIS);
- Project Emergency Flow Restriction Device (EFRD) (valve location) study;
- Guidance notes referenced in this Chapter.

Population and Human Health

15.3.5 The human population could potentially be vulnerable to fires and subsequently the effects of smoke, but no explosive or toxic hazards are identified within the Material Safety Data Sheet for aviation fuel.

15.3.6 Aviation fuel is flammable, but will NOT form a flammable vapour mixture in air under UK ambient conditions. The flash point for aviation fuel is 38°C and it has an auto-ignition temperature of 200°C.

15.3.7 Apart from the previously noted above ground infrastructure or exposure through third party damage, the pipeline will be below ground preventing any formation of other forms of flammable mixtures with air such as mists.

15.3.8 The optimal location for the new PIG launcher and receiver station at Boorley Green is still being determined. A new PIG receiving station would be installed at the West London Terminal storage facility to replace the existing PIG receiver. Risks at this

location would be broadly similar to present. Valves are located in rural areas, distant from major populations.

15.3.9 The assessment regarding population and human health would use information from other Chapters within the assessment Report, such as the locations of key populations (see Chapter 13) and the effect of the Project on human health (see Chapter 14).

Biodiversity

15.3.10 Biodiversity is considered with particular attention to protected species and habitats. There are a large number of designated habitats along the route (please refer to Chapter 7 for details). Notable habitats which the pipeline passes through include SPAs, SACs and SSSIs, particularly:

- Boorley and Long Valley (north west of Aldershot, Section D);
- Colony Bog and Bagshot Heath (south of Lightwater, Section F);
- Chobham Common (north of Chobham, Section F).

15.3.11 The presence of protected species along the route is currently being investigated. Consequently, findings are not available at this stage, so would be evaluated for impact of major accidents at later stages of the assessment process.

Land, Soil, Water, Air and Climate

15.3.12 The current land use is described in Chapter 12 and soils and geology are described in Chapter 11.

15.3.13 Landfill sites have been identified at:

- South/West of Frimley (historic landfill, Section E));
- North East of Addlestone (historic landfill, Section G) follows route of existing pipeline;
- West of Shepperton (historic landfill, Section H);
- West of Shepperton (authorised landfill, Section H) follows route of existing pipeline;
- West of Queen Mary Reservoir (historic landfill, Section H) follows route of existing pipeline);
- West of Queen Mary Reservoir (authorised landfill, Section H) follows route of existing pipeline;
- South East of Staines Reservoir (historic landfill, Section H) follows route of existing pipeline;
- West London Terminal storage facility (historic landfill, Section H) follows route of existing pipeline).

15.3.14 The water environment is described in Chapter 8; key water aspects that are considered under major accidents are Source Protection Zones (SPZs) and major river crossings.

15.3.15 Source Protection Zones that the pipeline is routed through have been identified at

- North of Bishop's Waltham (SPZ2 & 3, Section A) follows route of existing pipeline;

- South East of New Alresford (SPZ2 & 3, Section B) follows route of existing pipeline;
- East of Ropley (SPZ2 & 3, Section B) follows route of existing pipeline;
- South West of Ewshot (SPZ3, Section G) follows route of existing pipeline;
- North of Addlestone (SPZ2 & 3, Section G) follows route of existing pipeline.

15.3.16 Major river crossings are identified as the River Thames (Section G).

15.3.17 Air quality is described in Appendix 8.1.

Material Assets, Cultural Heritage and Landscape

15.3.18 Aspects of the Historic Environment are described in Chapter 9, and landscape in Chapter 10.

15.3.19 Material assets are described in the Chapter on land use (Chapter 12).

Nearby Major Accident Installations

15.3.20 It is considered that for a pipeline incident to initiate a major accident at a nearby installation, a major fire would be required at a pipeline AGI. From the available mapping, no such installations have been identified nearby, so this scenario is not considered credible. This assumption will be reviewed in later stages using the HSE Planning Web App to confirm locations of Hazardous installations near to AGIs.

15.3.21 The pipeline replaces the existing line which terminates at the West London Terminal storage facility. This facility does fall within COMAH and the assessment and management of risks arising through the installation and operation of the new pipeline (the Project) will be dealt with under the existing requirements under COMAH which apply to the West London Terminal storage facility.

15.3.22 If an AGI is impacted by an adjacent fire or explosion, the harm is considered to be similar to that resulting from loss of containment at the AGI from other causes. Consequently, if identified, such scenarios will be considered as additional initiating events of the same incident.

15.4 Likely Significant Effects

Sources of Major Accident Events

15.4.1 Decommissioning activities would be subject to an appropriate decommissioning strategy, as per Chapter 3. It is not practical to assess the effects of decommissioning at this stage as the methodology and good practice mitigation measures will not be defined until closer to the time, likely to be at least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

15.4.2 During construction, release of diesel from temporary storage has been identified as a possible hazard (albeit sub-MATTE and not an MAE). Good construction practice to prevent release from diesel refuelling activities are summarised in Chapter 4 and will be incorporated into the CoCP. The release of diesel therefore is scoped out of the assessment for MAE under Planning Inspectorate Advice Note 7 questions 5 and 6.

Release of diesel from mobile units is scoped out due to good construction practice to be contained in the CoCP.

15.4.3 The route crosses some landfills, potentially leading to new migration paths for landfill gas, which may accumulate at flammable concentrations. The presence of methane in the pipeline route has yet to be confirmed. If identified, appropriate engineering would be used to ensure landfill integrity is maintained. The route crosses many of the same landfill sites as the existing pipeline with no recorded issues. As there is technology to prevent damage to landfill integrity and the existing pipeline in these locations has not caused any issues, the effects from landfill sites has been scoped out (Planning Inspectorate Advice Note 7 questions 5 and 6).

15.4.4 Once the pipeline is operational, significant release of aviation fuel is considered to be the only MAE to consider.

15.4.5 Data on pipeline failures in both liquid and gas pipeline operations are provided by operators to industry organisations, regulatory bodies and others for analysis to improve understanding of pipeline hazards and operability and inform development in engineering and operational controls. Understandably, many of these data sets and analyses examine data on MAHP carrying natural gas at high pressures (for example, HSE Report R1035 and the UK Onshore Pipeline Association (UKOPA) data sets). The proposed pipeline is not an MAHP and therefore the following report has been drawn upon the Concawe (the technical body focussing on environmental science for the European refining sector) report 6/18 “Performance of European cross-country oil pipelines - statistical summary of reported spillages in 2016 and since 1971”. This report forms part of the HSE R1035 report and is based on data from liquid hydrocarbon pipelines only.

15.4.6 The data reflect the improvements in engineering design and operational controls over the full period of the work. Increased use of intelligent Pipeline Inspection Gauges (PIG) to characterise pipeline conditions and identify weaknesses, coupled with cathodic protection, allied with real time monitoring of pressure (as applied on the current line) address the risks from both third party damage and other failure mechanisms.

15.4.7 Over the full period of the study approximately 60% of failures resulted from third party activity with 37% from theft and 24% third party damage. The majority of third party incidents result in larger holes. Spillages not involving a hole in the lines normally relate

to mechanical failures of fittings and other ancillary equipment (gaskets, pump seals, instrument connections etc.), and as such these vulnerable features will be minimised during the design process.

15.4.8 Over the same period there were no instances of fires reported from any aviation fuel cross country pipelines and associated AGI across Europe.

15.4.9 Consequently, the dominant source of a potential MAE is identified as third party intervention leading to a release of aviation fuel.

Likely Effect on Receptors

Population and Human Health

15.4.10 Considering toxicity, the Material Safety Data Sheet (MSDS) for aviation fuel does not identify any associated toxicity and consequently toxicity is scoped out under Planning Inspectorate Advice Note 7 (PINS, 2017) question 2.

Explosions are not considered credible because of the unconfined space around the above ground installations

15.4.11 The potential for an explosion at an AGI is not considered credible given the unconfined space around such equipment, so is scoped out under Advice Note 7 question 3.

15.4.12 The design has incorporated the principles of inherently safe design and good practice. In addition, aviation fuel is not flammable under UK ambient conditions and historic data supports the conclusion that aviation fuel does not present a MAE fire risk to population and human health. Therefore, the potential for a fire related MAE is scoped out of the assessment.

Effects on populations and human health would be scoped out of the EIA for aviation fuel.

Biodiversity

15.4.13 Experience of MATTE assessments indicates that where protected species are mobile or live in metapopulations, then the risk to the species overall is low and tolerable. Consequently, areas where such fauna exist would not likely be significantly harmed by a MAE (Planning Inspectorate Advice Note 7 questions 1, 2, 3 and 5). They are therefore scoped out of the assessment.

Effects on species that can't readily move (such as plants) or are in small populations would be scoped into the EIA.
Species that are in large spread out populations or which could easily move out of the way would be scoped out of the EIA.

15.4.14 Areas where protected plants exist, or where rare animals that are not mobile live, then the impact of a MAE may be more significant. These would therefore be scoped into the assessment.

Land, Soil, Water, Air and Climate

15.4.15 It has been identified that the pipeline may possibly be routed through a number of historic landfill sites. Investigations are currently ongoing to establish the type of wastes that the landfills contain, which would help determine if methane is present to

inform detailed construction planning, engineering and occupational health control measures. Where appropriate the installation will include measures to reinstate and or maintain containment in order to prevent landfill gas migration. The likelihood of the proposed open cut techniques and trenchless works facilitating the release of significant volumes of methane-rich landfill gas from historic landfill is believed to be very low. Consequently, the potential for this aspect of the works to precipitate a MAE is considered to be negligible and it is scoped out.

Aviation fuel is not toxic to humans. The assessment of human health impact from a potential release of aviation fuel is scoped out.

15.4.16 Figures 2 & 3 of the EI guidance note on environmental recovery durations show that '*Gas Oils'* (which includes diesel) and '*kerosenes'* (which includes aviation fuel') can lead to MAEs, depending on the habitat impacted. Recovery duration is defined as "greater than 80% of the damage recovered". The recovery durations described in the guidance are summarised in Table 15.1.

Table 15.1: Assessment criteria for environmental recovery.

Description	Short Term	Medium Term	Long Term	Very Long Term
	Harm with such short recovery is not considered MATTE.			
Harm duration category	1	2	3	4
Groundwater or surface water drinking water source.			Harm affecting drinking water source or Source Protection Zone (SPZ) <6 years.	Harm affecting drinking water source or Source Protection Zone (SPZ) >6 years.
Surface water (all except public or private drinking water source).	< 1 year	>1 year	>10 years	>20 years
Land	< 3 years	>3 years or >2 growing seasons for agricultural land.	>20 years	>50 years
Built environment	Can be repaired in <3 yrs.	Can be repaired in >3 years, such that its designation can be reinstated.	Feature destroyed, cannot be rebuilt, all features except world heritage sites.	Feature destroyed, cannot be rebuilt, world heritage sites.

15.4.17 For all identified water habitats close to the pipeline (e.g. ponds, lakes, reservoirs, streams, rivers), a release of diesel or aviation fuel is considered to have a Category 1/2, Short/Medium term recovery duration.

15.4.18 For land and soils in the vicinity of the pipeline, the recovery duration varies depending on the land habitat. For example, agricultural land is Category 2 – Medium Term duration recovery, whilst woodland, forest and bog are Category 4 - Very Long Term duration recovery.

15.4.19 The release of aviation fuel to air following a MAE would be negligible in quantity. It would also not impact global climate change issues such as global warming, changed rainfall, flooding, ozone depletion etc. Under Planning Inspectorate Advice Note 7 question 3, all releases of aviation fuel to air are scoped out of the assessment.

The release of aviation fuel to the air and effects on global climate and air quality would be scoped out.
The release of aviation fuel to land, soil and water would be scoped in.

15.4.20 The intrinsic properties of aviation fuel identify it as flammable (Global Harmonized System classification H226). However it is not easily ignited and under UK ambient conditions as it will not form a flammable mixture in air. A pipeline failure in or around AGIs when the pipeline is above ground could lead to a pool of aviation fuel and fuel source for a pool fire which could potentially be ignited by a suitable ignition source. However, data from the operation of several 100km of aviation fuel pipelines in the UK and Europe (Concawe) offer no evidence of a pool fire any other fire occurring over many decades of pipeline operation. Consequently it is not intended to assess the potential impacts on air quality from a fire following a release of aviation fuel.

Material Assets, Cultural Heritage and Landscape

15.4.21 For material assets and cultural heritage to be impacted by a MAE requires a major fire. These receptors are therefore scoped out of the assessment under Planning Inspectorate Advice Note 7 questions 1 and 3.

15.4.22 Protected habitats are covered under Biodiversity. Landscape does not have any assessment criteria under major accidents, so is scoped from the assessment on this basis under Planning Inspectorate Advice Note 7 question 2.

15.5 Impact Assessment Methodology

15.5.1 The assessment would consider the potential for, and impacts of MAEs along the length of the pipeline, from Boorley Green to the West London Terminal storage facility.

15.5.2 The CDOIF guideline recommends considering receptors within 10km of the source. This study would consider impact to the most sensitive receptors identified within 10km of the pipeline, and the nearest receptors.

15.5.3 Pipeline failure rates will refer to recent data presented in Concawe report 6/18 “Performance of European cross-country oil pipelines - statistical summary of reported spillages in 2016 and since 1971”. This report which forms part of the HSE R1035 report and is based on data from liquid hydrocarbon pipelines only. Assessment would consider all sizes of leaks, as if left unmitigated, any size leak has potential to cause harm to a receptor. The releases from smaller holes take longer to reach harm thresholds. The assessment will examine the worst case release scenario first.

Major Accidents to the Environment

15.5.4 The impact assessment methodology for MATTEs will be assessed by identifying source-pathway-receptor linkages and considering likelihood of a release, potential volumes and the sensitivity of possible receptors. A candidate methodology is CDOIF although CDOIF Environmental Assessment is normally used to assess MATTEs potentially arising from single location process plants. This methodology therefore would need to be modified to address linear projects, such as a pipeline.

15.5.5 The main aspect that would require modification is the selection of representative receptors. The most vulnerable receptors to be considered would be based on sensitivity and international/national importance. This assessment has been carried out under Chapter 7.

15.5.6 Pipe failure will be considered for MATTE assessment. The initial risk assessment would be carried out on the most vulnerable receptors. If this demonstrates that there would be no significant effects, then it can be inferred deduced that lesser vulnerable receptors would not suffer significant effects either.

15.5.7 The most sensitive receptor within 10km of pipe, Colony Bog (Section F) is next to the pipeline and is a highly sensitive receptor. Where this initial assessment identified potentially significant effect the methodology will be applied to additional receptors of lower sensitivity until all the potentially significant MATTE effects are characterised.

15.6 Summary Scope for the EIA

15.6.1 Table 15.4 presents a summary of the topics scoped in and out of the EIA.

Table 15.4: Matters scoped into the EIA for major accidents

Designation	Aspect	Location	Comments
Substances for consideration by receptor	Diesel	N/A	Scoped out based on limited scale and mitigation during construction
	Aviation fuel	N/A	Scoped in for consideration of potential environmental harm and for localised fires.
	Methane	N/A	Scoped out, as no evidence of release from existing crossings of landfills.
Population and human health	Fire impact	Near to AGIs	Scoped out based on historic data and aviation fuel properties.
	Explosion impact	Near to AGIs	Scoped out, not credible.
	Toxicity impact	Throughout Project	Scoped out, as aviation fuel not toxic.
Protected plants	Toxicity impact	Throughout Project	Scoped in and most at risk considered.
Protected fauna	Toxicity impact (species that cannot readily move away or are in small populations).	Throughout Project	Scoped in and most at risk considered.
Protected fauna	Toxicity impact on species that are in metapopulations or which can readily move away.	Throughout Project	Scoped out, as unlikely to harm a significant proportion of the overall population.

Designation	Aspect	Location	Comments
Land	Pollution impact	Throughout Project	Scoped in and vulnerable receptors considered.
Soil	Pollution impact (within designated habitats).	SSSIs	Scoped in and vulnerable receptors considered.
Surface water	Pollution impact	Throughout Project	Scoped in and vulnerable receptors considered.
Groundwater	Pollution impact	Throughout Project	Scoped in and vulnerable receptors considered.
Air	Air Pollution	Throughout Project	Scoped out, due to intrinsic properties and historic data.
Climate	N/A	Throughout Project	Scoped out as climate will not be impacted by a major accident.
Material assets	Smoke or Fire damage	Throughout Project	Scoped out based on historic data and aviation fuel properties.
Cultural heritage	Smoke or Fire damage	Throughout Project	Scoped out based on historic data and aviation fuel properties.
Landscape	Pollution impact	Throughout Project	Scoped out, as landscape does not have any assessment criteria under major accidents.

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Chapter 16
Cumulative Effects

Scoping Report Volume 1

JACOBS

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16. Cumulative Effects

16.1 Introduction

16.1.1 Cumulative effects occur when impacts caused by past, present and reasonably foreseeable activities combine to create an increased level of effect. They can occur during construction, operation and decommissioning phases of the Project.

16.1.2 This chapter outlines potential likely significant cumulative effects associated with the Project, both where a single receptor can be affected by multiple aspects of the same development (Intra-development effects) and where the effects of a development can be increased due to interactions with the effects of other proposed developments (Inter-development effects). The chapter also identifies the receptors and other developments that are proposed to be scoped into further assessment in the ES.

16.1.3 IEMA's guidance (IEMA, 2011) provides a definition for each of the two categories of cumulative effects which is described in Section 16.3 and will be utilised in this assessment.

16.1.4 The assessment of cumulative effects will be kept up to date as more information is gathered for each topic and as more information becomes available on other proposed developments.

16.2 Legislation and Policy

Legislation

EU EIA Directive

16.2.1 Article 3 1(e) of EU Directive 2014/52/EU refers to assessment of "*the interaction between the factors referred to in points (a) to (d)".* It states these as:

(a) population and human health;
(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
(c) land, soil, water, air and climate and landscape; and
(d) material assets, cultural heritage and the landscape;

16.2.2 Annex IV 5(e) states that a description should be included of the significant effects arising from:

"the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources".

Infrastructure Planning (EIA) Regulations 2017

16.2.3 Schedule 4 section 5(e) of the Infrastructure EIA Regulations requires that an ES should include a description of cumulative effects, as stated in Annex IV 5(e) of the Directive (see above).

Policy

16.2.4 The need to consider cumulative effects in planning and decision making is set out in the relevant NPSs. The Overarching NPS for Energy (EN-1) (DECC, 2011) paragraph 4.2.5 states that,

"*when considering cumulative effects, the ES should provide information on how the effects of the applicant's proposal would combine and interact with the effects of other developments (including projects for which consent has been sought or granted, as well as those already in existence)*".

16.2.5 NPS EN-1 paragraph 4.2.6 states that the Secretary of State should consider how the

"*accumulation of, and interrelationship between effects might affect the environment, economy or community as a whole, even though they may be acceptable when considered on an individual basis with mitigation measures in place*".

16.2.6 NPS EN-4 paragraph 2.19.8 states that consideration should be given when choosing the route of a pipeline to *"..proximity of existing and planned residential properties.."* This refers to inter-development effects.

Guidance

16.2.7 The European Commission (1999) provides guidelines for the assessment of indirect and cumulative impacts as well as impact interactions.

16.2.8 The PINS Advice Notes do not give any specific guidance on intra-development cumulative effects, but PINS Advice Note Nine: Using the 'Rochdale Envelope' (PINS, 2018) makes the general point that the interactions between aspect assessments (including where a number of separate impacts e.g. noise and air

quality, affect a single receptor such as fauna) should be taken into account relevant to the worst case scenario(s) established, and consideration given to how these are assessed.

16.2.9 Similarly, there is no specific guidance on inter-development cumulative effects, however, PINS Advice note Nine (2018) points to "*ensure that the assessment of the worst case scenario(s) addresses impacts which may not be significant on their own but could become significant when they inter-relate …. cumulatively with impacts from other development (including those identified in other aspect assessments).*"

16.2.10 There is no standard approach to the assessment of cumulative effects. However, PINS Advice Note 17 (PINS, 2015) provides advice on a '*staged process that applicants may wish to adopt in cumulative effects assessment…*'.

16.2.11 The staged process is described in Section 6.3.

16.3 Baseline

Intra-development Cumulative Effects

16.3.1 These occur when a resource or receptor or group of receptors are potentially affected by more than one source of environmental impact from the same development. These impacts act together in an additive and/or synergistic manner (IEMA, 2016). For example, a community that is affected by noise, dust and traffic impacts from two separate development projects.

16.3.2 The Scoping Report is structured so that such effects have been identified within the topic chapters. For example, the effects of air, traffic and noise are all assessed cumulatively within Chapter 13 People and Communities (with details in the Technical Notes in Appendix 8). The baseline for this chapter will therefore be formed from these chapters.

16.3.3 As construction and operational phases of the Project occur at different times, they do not act cumulatively with each other.

16.3.4 There is no standard approach to the assessment of intra-development effects, so in this report a checklist matrix has been used. The checklist in Table 16.2 shows receptors and the range of likely effects. Potential significant effects which are not covered by other topic chapters, would be subsequently scoped into the ES under this chapter. Professional judgment has been used to identify whether potential cumulative effects could occur across the topics.

Inter-development Cumulative Effects

16.3.5 These occur when a resource or receptor or group of receptors are potentially affected by more than one development at the same time and the impacts act together additively and/or synergistically (IEMA, 2016).

16.3.6 The baseline for these effects is constantly changing as new applications for development consent or planning permission are made. The baseline presented here therefore reflects the current situation. During the EIA, further development of the baseline will occur. A review of proposed developments along the route has been undertaken. Planning applications held by the local planning authorities along the route have been retrieved and reviewed. Nationally Significant Infrastructure Projects (NSIPs) on the Planning Inspectorate's Programme of Projects have been reviewed. Reasonably foreseeable developments (as defined by Advice Note Seventeen and specified in section 16.2) have been identified.

16.3.7 Rejected and withdrawn planning applications have been scoped out of the assessment. Allocated sites in Local Plans or other Development Plans which are not yet subject to planning applications, have been excluded from the assessment. This is because the development or operation timeframe of these proposed development sites are not yet known at this stage. During the EIA, should there be any new developments which are subject to planning applications, they would then be further considered.

16.3.8 The current assessment has incorporated this guidance into the methodology, a summary of which is provided in Table 16.1. Professional judgment has been used in the selection of developments and Stage 1 has been split into four steps to establish a long list of developments.

Table 16.1: Summary of approach to baseline collection for inter-development assessment

Stage	Description
1a Establish Zone of Influence (ZoI) for each environmental topic	The ZoI for each of the environmental topic has been identified by topic experts and provided here: Biodiversity, Groundwater, Designated Heritage Assets, Landscape and Visual, Soils and Geology – 1km; Surface Water – 500m; Local Communities – 500m; Historic Environment – 300m; Contaminated Land – 250m; Dust – 200m; Noise (Urban - Residential) – 55m; Noise (Rural - Residential) – 50m; Noise (Urban - Others) – 545m; Noise (Rural - Others) – 160m; Vibration (due to ground compaction) – 60m; Vibration due to trenchless construction – 20m; Land Use – footprint of construction; Traffic – 5km (from consideration of approximately 2.5km of traffic influence on the network from the Project and from other DCO developments).
1b Establish project's maximum search area for each key type of development (based on stage 1a)	• NSIPs on the Planning Inspectorate's Programme of Projects. Search area = 5km (due to possible construction traffic effects). • Major developments (as defined under Development Management Procedure (England) Order 2010), e.g. housing development of 10 or more dwellings. Search area = 1km (due to possible construction traffic effects) • Minor planning applications, e.g. local planning application for garage extension. Search area = 200m (due to possible noise and dust effects). The chosen distance of the search area has been influenced by ZoI for the topic that was considered to cause the greatest potential for cumulative effects for that type of development; and the size and type of developments Example 1: dust and vibration were considered to be the cause of greatest potential effects for planning application developments. Therefore, the ZoI for dust and noise is the search area for planning applications (200m). Example 2: effects of construction traffic on the local network would be larger for NSIPs than major developments. Hence, a 5km ZoI for NSIPs and 1km for major developments has been decided. These areas have been considered to be a sensible buffer given the potential scale of effects from the Project.

1c Additional exclusion criterio	Due to the extent of the Project and by its nature having mainly temporary, construction effects, a sub-criterion was created of very minor planning applications (anything less than constructing a new residential unit). These minor developments have been excluded from the assessment, as they would not be likely to cause a significant Type 2 effect due to their small size and the transient nature of the pipeline construction.
1d Tier classification	Developments selected in Stage 1b and 1c have been categorised into PINS Tier categories. These developments are now known as the 'Long List'.
2 Identify Short List of selected developments	The 'Long List' has been filtered by the following criteria to create a 'Short List'. • Temporal scope (whether the development would be potentially carried out at the same time as the Project). Planning applications have a time limit for construction of three years. If they have not been started within this time, the planning application would lapse. Therefore, applications consented before 2017 but not yet started have been scoped out. • Nature and size of the development (below the following thresholds developments have been scoped out): The NPS provides no guidance on shortlisting developments. Therefore n professional judgement has been used to scope in the relevant development Planning applications which fall below the following criteria have been excluded: ○ Residential – 10 or more new units / more than 0.5ha development; ○ Office / light industrial – more than 1 ha development; ○ General industrial – more than 1 ha development; and, ○ Retail – more than 1 ha development. Professional judgment has also been used during the application of threshold criteria to decide whether development should be scoped in or out. For example, for developments that are close to the thresholds and have characteristics likely to give rise to a significant effect.

16.3.9 Developments in the 'Long List' can be found in Appendix 9 as well as in Figure 16.1. Developments in the 'Short List' are listed in Table 16.4.

16.4 Likely Significant Effects

16.4.1 Decommissioning activities would be subject to an appropriate decommissioning strategy, as stated in Chapter 3. It is not practical to assess the effects of decommissioning at this stage as the methodology and likely good practice mitigation measures will not be defined until closer to the time, at least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

Intra-development Cumulative Effects

16.4.2 Likely significant effects are identified within the topic chapters 7 to 15 within this report. Potentially, local communities (including schools), biodiversity, tourists, historic landscapes and heritage assets could be affected by multiple environmental effects. All of these have already been cumulatively assessed within the Scoping Report. For example, the effects of visual change, community severance and construction traffic, noise and vibration have been covered for each group of receptors within the People and Communities Chapter. These findings are summarised in Table 16.2.

Table 16.2: Potential Intra-development cumulative effects

Receptors	Construction effects										Operation effects								
	Dust/ Sediments	Hydrological Changes	Landscape change	Visual change	Community severance	Noise	Vibration	Traffic	Major accidents	Other	Dust/ Sediments	Hydrological Changes	Landscape change	Visual change	Community severance	Noise	Vibration	Traffic	Major accidents
Local residents – rural (including schools)				✓		✓	✓												✓
Local residents – urban (including schools)				✓	✓	✓	✓	✓											✓
Biodiversity		✓		✓		✓	✓		✓										✓
Tourism (Rural)				✓		✓	✓												
Tourism (Urban)				✓		✓	✓	✓											
Surface Water	✓								✓										✓

Receptors	Construction effects										Operation effects								
	Dust/ Sediments	Hydrological Changes	Landscape change	Visual change	Community severance	Noise	Vibration	Traffic	Major accidents	Other	Dust/ Sediments	Hydrological Changes	Landscape change	Visual change	Community severance	Noise	Vibration	Traffic	Major accidents
Soils									✓	Contaminants . Leakage									✓
Ground Water	✓								✓										✓
Cultural Heritage				✓						Damage from excavation works									

16.4.3 Table 16.2 identifies that there could be potential cumulative effects on receptors due to the combination of effects. Even where effects are not significant within the Chapters, combined effects could become significant.

16.4.4 There is no single receptor identified which has the potential to be affected by more than one effects arising from the Project during its operational phase. Hence it is concluded that there will be no operational Intra-development cumulative effects and it is scoped out.

16.4.5 Effects are scoped into the topic chapters. Therefore, a summary will be presented in the ES Cumulative Effects chapter. Table 16.3 identifies where Type 1 cumulative effects on observed receptors would be covered in the ES.

Construction Phase Intra-development cumulative effects: Scoped in but included within other chapters and would only be summarised in Cumulative Effects chapter in the ES.

Operation Phase Intra-development cumulative effects: None known in operational phase, hence scoped out.

Likely significant inter-development effects would be mainly caused by combined construction traffic, dust, noise and vibrations arising from other developments with the Project.

Table 16.3: Where Intra-development cumulative effects would be covered in the ES

Sensitive receptors	Where assessment would be covered in the next stage.
Local urban communities (including schools) and urban tourists	Chapter 13 People and Communities; Chapter 15 Major Accidents
Biodiversity	Chapter 7 Biodiversity Chapter 15 Major Accidents
Historic landscapes and heritage assets	Chapter 9 Historic Environment
Water	Chapter 8 Water
Accidents	Chapter 15 Major Accidents

Inter-development Cumulative Effects

16.4.6 The Long List of developments in the study area is located in Appendix 9. Table 16.4 shows developments that have been shortlisted, with a justification for each.

16.4.7 The Project's construction effects are likely to be experienced during the period 2020-2021, while operational effects are likely from 2022.

Table 16.4: Developments scoped into Cumulative Effects chapter of the ES (Short List)

No.	Application Ref	Description of the Development	Date of Application	Size of the Project	Status	Within Temporal Scope?	Justification for scoping in (including nature and size)
NSIP/Significant Developments within 5km							
1	-	Heathrow Expansion - Adding a Northwest Runway at Heathrow. This is located 3.55 km to the north of the Project.	Application for development consent due in 2019/2020 (Scoping Report May 2018)		Tier 2	Yes (Planned commencement of development 2021)	As per current plan, a decision on this scheme is due in 2021 with the aim to start construction the same year. Due to the temporal overlap between this development and the Project during the construction phase, as well as the distance between them, this has been scoped in for traffic.
2	-	Western Rail Link to Heathrow - Rail link from Reading Station to Heathrow Terminal 5 by building new rail tunnel to link the Great Western Mainline to Heathrow Airport. Located 3 km from the	2019		Tier 2	Yes (Planned commencement of development 2020 - 2027)	3km from Project within urban area. Unlikely to cause visual, dust or noise cumulative effects due to distance. Scoped in for traffic.

No.	Application Ref	Description of the Development	Date of Application	Size of the Project	Status	Within Temporal Scope?	Justification for scoping in (including nature and size)
		Project.					
3	-	Southern Rail Link to Heathrow - Southern rail connection between Chertsey, Virginia Water and Staines with Heathrow Terminal 5. This scheme intersects with SLP.	Operational likely between 2025-2027		Tier 3	Although timescales haven't been published as yet, in order to achieve the given operational timescales, there is a possibility that construction timescales will overlap with the Project	There is insufficient information available at this time regarding its timescale and other details. However, in order to achieve the given operational timescales of 2025-2027, there is a possibility that construction timescales will overlap with the Project. Hence it is scoped in due to cumulative effect of all topics.
4	-	Windsor Rail Link – Phase 1 Connects Great Western rail line from Slough and Windsor with Windsor Waterloo line and Phase 2 connects Heathrow to western and southern parts. The	Scoping late spring 2018/ submission of DCO in 2020		Tier 3	Yes (construction in 2022)	Phase 1 of the proposed development is almost 10km distance, hence no likely cumulative effects envisaged. However, Phase 2 is located approximately 1.5 km and thus there is a

No.	Application Ref	Description of the Development	Date of Application	Size of the Project	Status	Within Temporal Scope?	Justification for scoping in (including nature and size)
		existing railway line of Windsor Waterloo line intersects with SLP					potential to have cumulative effects. The scheme is likely to commence 2022. Scoped in due to cumulative effects on traffic.
7	-	Water infrastructure projects in Hampshire: This scheme consists of a number of sewer improvements, flood protection schemes, upgrades to treatment works and projects to improve the quality of treated wastewater to meet European legislation.	Timescale 2015 -2019		Tier 2	Yes	The scheme is expected to be completed by 2019 (except for Testwood works which is scheduled for 2025). Hence it is initially scoped in for assessment.
Major Developments/ Planning Applications within 1km							
8	-	Thames Flood Alleviation Scheme Planning Application - Flood relief channel from Datchet to Teddington Lock	2018	Flood channels between 30 to 60m wide and 14 km long	Tier 2	Yes (Planned commencement of development 2020 - 2021)	Scoped into assessment for all aspects particularly water issues due to intersection with Project both in location and time.

No.	Application Ref	Description of the Development	Date of Application	Size of the Project	Status	Within Temporal Scope?	Justification for scoping in (including nature and size)
11	12/0546	Hybrid planning application for major residential-led development of 1,200 new dwellings - Princess Royal Barracks, Brunswick Road, Deepcut, Camberley, GU16 6RN	04/04/2014	114.32 ha	Tier 1	Yes (Construction to start in 2018)	Considering the scale and proximity of the development, there is a potential to have both temporal overlap as cumulative effects with visual, dust, noise and traffic. Hence scoped in for assessment.
17	16/1207	Three detached two storey dwellings with detached double garages, entrance gates and associated accesses and landscaping at Windlemere Golf Club, Windlesham Road, West End, Woking, GU24 9QL.	23/12/2016	16.26 ha	Tier 1	No	This scheme is just outside the temporal threshold; however, the development area will be intersected by the construction corridor. Due to the size of the development, there may be a potential of overlap in the construction phases, causing cumulative effects on dust, noise and visual aspect. Hence this will be scoped in.

No.	Application Ref	Description of the Development	Date of Application	Size of the Project	Status	Within Temporal Scope?	Justification for scoping in (including nature and size)
19	17/0469	Erection of 4 x 2-bed terraced houses, 4 x 3-bed terraced houses, and 2 x four bed semi-detached houses with associated parking, landscaping and gardens, and creation of new access road at Heathercote Yard, Evergreen Road, Frimley, Camberley, GU16 8PU	18/12/2017	0.27 ha	Tier 1	Yes	Considering the scale and proximity of the development, there is a potential to have cumulative effects with visual, dust and noise. Hence scoped in for assessment.
26	RU. 16/1053	Redevelopment of land to rear of existing office buildings to provide 174 residential units and associated access, car parking and landscape works (known as Phase 2) at Land to the rear of Aviator Park Station Road Addlestone Surrey.	30/06/2016	1.6 ha	Tier 1	No	The scheme is just outside the temporal threshold. However due to the size of the scheme, there is a potential that the scheme's construction phase may extend to overlap with the Project's construction phase. Hence scoped in for assessment for traffic (located 1km from the Project)

No.	Application Ref	Description of the Development	Date of Application	Size of the Project	Status	Within Temporal Scope?	Justification for scoping in (including nature and size)
27	RU.16/1748	Proposed works comprising 1) Multi faith Prayer Room; 2) Offices and ancillary accommodation for ITU and CCU; and 3) Modify the Outpatients Block at St Peters Hospital Guildford Road Chertsey KT16 0PZ	18/12/2017	1.44 ha	Tier 1	Yes	Considering the scale and proximity of the development (350m from the Project), there is a potential to have cumulative effects with visual, dust, noise and traffic. Hence scoped in for assessment.
28	RU.16/1765	Rear and roof extension to existing office building to provide 22 new residential units, with associated landscaping, car parking and other infrastructure at 120-122 Bridge Road Chertsey KT16 8LA	18/12/2017	0.4 ha	Tier 1	Yes	Considering the scale and proximity of the development, there is a potential to have cumulative effects with visual, dust, noise and traffic. Hence scoped in for assessment.
30	RU.17/1136	Proposed demolition of existing Runnymede Centre (former The Meads School); construction of new 6FE secondary school and associated developments at Chertsey High School	18/07/2017	1.9 ha	Tier 1	Yes	Considering the scale and proximity of the development, there is a potential to have cumulative effects with visual, dust, noise and traffic. Hence scoped in for assessment.

No.	Application Ref	Description of the Development	Date of Application	Size of the Project	Status	Within Temporal Scope?	Justification for scoping in (including nature and size)
		Runnymede Centre (former The Meads School), Chertsey Road, Addlestone KT15 2EP					
32	RU.18/0206	EIA Screening Opinion Request for proposed development for approximately 250 dwellings at Land North of Green Lane, Addlestone, Surrey.	05/02/2018	9.4 ha	Tier 1	Yes	Considering the scale and proximity of the development, there is a potential to have cumulative effects with all aspect. Hence scoped in for assessment.
33	O/16/78389	Outline Application: Residential development of up to 50no. dwellings with associated infrastructure at Crows Nest Lane, Botley, Southampton, SO32 2DD	13/05/2016 / 28/07/2017	1.63h	Tier 1	Yes	Considering the scale and proximity of the development, there is a potential to have cumulative effects with visual, dust, noise and traffic. Hence scoped in for assessment.
35	R/16/79470	Reserved matters application (pursuant to outline planning permission O/12/71514 which was subject to an Environmental Impact Assessment) for the	10/11/2016 / 13/10/2017		Tier 1	Yes	Considering the scale and proximity of the development, there is a potential to have cumulative effects with all aspects. Hence scoped in for assessment.

No.	Application Ref	Description of the Development	Date of Application	Size of the Project	Status	Within Temporal Scope?	Justification for scoping in (including nature and size)
		erection of 889no. Dwellings and associated infrastructure at Land to the north and east of Boorley Green, Winchester Road, Botley, Southampton SO32 2UA					
36	20209/011	Outline planning application for residential development for up to 10 dwellings and associated works at at Ropley Lime Quarry, Soames Lane, Ropley, Alresford, SO24 0ER	11/1/2017		Tier 1	Yes	Considering the scale and proximity of the development, there is a potential to have cumulative effects with visual, dust and noise. Hence scoped in for assessment.
Other Planning Applications							
43	16/00196/FUL	Demolition of existing commercial building and erection of a part 3-storey, part 4-storey residential development comprising 26 flats (7 no.1-bed, 17 no. 2-bed and 2 no. 3-bed) together with associated parking and amenity space at Land at Rear, Imtech	31/03/2016	1554 m^2	Tier 1	No	The scheme is just outside the temporal threshold. However due to the size of the scheme, there is a potential that the scheme's construction phase may extend to overlap with the Project's construction phase. Hence scoped in for assessment for all

No.	Application Ref	Description of the Development	Date of Application	Size of the Project	Status	Within Temporal Scope?	Justification for scoping in (including nature and size)
		House, 33 - 35 Woodthorpe Road and Part of 37 Woodthorpe Road, Ashford, TW15 2RP.					effects as it is in the immediate vicinity of the Project.
46	17/1815	Hybrid application (full planning application unless otherwise stated) comprising: (A) Redevelopment of west site (including demolition of all existing buildings) to provide 212 no. 1, 2, 3, 4 and 5 bedroom houses and flats and 116 no. 1 and 2 bedrooms retirement houses at St Peters Hospital, Chertsey, KT16 0PZ	2017		Tier 1	Yes	Considering the scale and proximity of the development, there is a potential to have cumulative effects with all topics. Hence scoped in for assessment.
51	Spelthorne 17/00560/FUL	Redevelopment of the site to provide one building comprising 9 apartments with associated infrastructure at 55A Woodthorpe Road, Ashford, TW15 2RP.	29/08/2017	0.16Ha	Tier 1	Yes	The proposed scheme is located in the immediate vicinity of the Project. Considering the scale and proximity of the development, there is a potential to have cumulative effects with

No.	Application Ref	Description of the Development	Date of Application	Size of the Project	Status	Within Temporal Scope?	Justification for scoping in (including nature and size)
							visual, dust and noise. Hence scoped in for assessment.
61	17/0932	A Minor Material Amendment application pursuant to planning permission SU/16/0095 (relating to the erection of 2 No. light industrial/ground industrial/warehouse buildings, (Class B1C/B2/B8) and ancillary office accommodation with parking and landscaping at Plots B & C, Trade City, Lyon Way, Frimley GU16 7AL	01/11/2018	1.5 ha	Tier 1	Yes	Considering the scale and proximity of the development, there is a potential to have cumulative effects with traffic. Hence scoped in for assessment.

16.5 Impact Assessment Methodology

Intra-development Cumulative Effects

16.5.1 As noted in paragraph 16.4.5, all identified receptors that could be subject to significant Intra-development effects will be assessed within the topic chapters and summarised within the Cumulative Effects chapter. Likely significant effects would be identified and appropriate mitigation and monitoring of these effects developed (see Chapter 6).

Inter-development Cumulative Effects

16.5.2 In the ES, environmental topics will consider the cumulative effects of the Project with each of the other developments identified. Professional judgment will be used to determine the potential for cumulative effects. Effects will be identified as direct, indirect, short-term or long-term, permanent or temporary. Their magnitude will be determined, any proposed mitigation measures would be taken into account, and the residual significance of the effects will be assessed.

16.5.3 Following scoping, the 'Short List' of other developments (Table 16.4) will undergo Stages 3 and 4 according to Advice Note 17 (PINS, 2015). The 'Short List' will be updated as further details about each development becomes available. It will also be refined as new planning applications are made. This information will be sought during consultation and engagement with Local Planning Authorities and other stakeholders.

16.5.4 Detailed information about each development will be collected for a robust assessment of cumulative effects. In particular, the temporal information of other developments (i.e. does the construction phase overlap with the Project) as well as the nature of their likely effects.

16.5.5 The assessment will be summarised in a table format similar to Appendix 2 of PINS Advice Note 17, also known as Matrix 2. The table would also identify any mitigation measures and residual Type 2 effects.

16.6 Summary Scope for the EIA

16.6.1 The decommissioning phase of the Project is scoped out of the ES.

16.6.2 Intra-development cumulative effects will be scoped within the topic chapters and summarised within the ES Cumulative Effects chapter.

16.6.3 Inter-development cumulative effects will be scoped in into the ES Cumulative Effects chapter. All developments within the 'Short List' (Table 16.4) and any new developments which meet Short list criteria would be assessed.

16.6.4 For Inter-development cumulative effects from construction, other developments have been identified based on the expected construction period of 2020-2021. Applications that could involve construction during this period would be considered using the Advice Note 17 methodology.

16.6.5 Consideration of the operational phase of the Project will be scoped into the EIA. Operation of the Project is likely from 2022 onwards. The baseline for this timescale of developments that could produce effects in combination with the current Project, is not yet known. Those matters scoped into the cumulative assessment are summarised in Table 16.5.

Table 16.5 Matters of potential significance for cumulative assessment

Other developments	Project phase	Location	Comments
NSIPs/Significant Development	Construction and Operation	Within 5km of the Project	Scoped in
Major Developments	Construction and Operation	Within 1km of the Project	Scoped in
Planning Application	All	Within 200m of the Project	Scoped in

Chapter 17
Next Steps

Scoping Report Volume 1

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17. Next Steps

17.1 Introduction

17.1.1 Following submission of this Scoping Report, the project design, planning and EIA will be progressed, including:

- Scoping Opinion and scoping consultation feedback which would be used to refine the scope of surveys and assessments, and to inform the ES;
- continued desk studies, data collation, and field surveys on the initial working route;
- continued stakeholder engagement including landowner and land interests liaison;
- ongoing design development and identification of potential additional mitigation measures, and potential environmental enhancements such as net biodiversity gain;
- construction logistics planning and developing the draft Code of Construction Practice;
- preparation of the Preliminary Environmental Information Report (PEIR), which will be submitted for the Statutory Consultation on the preferred route;
- Statutory Consultation; and,
- preparation of the ES, which will be submitted with the application for development consent.

17.1.2 These aspects are explored in more detail in the following sections.

17.2 Structure of the EIA

17.2.1 Due to the complex nature of the EIA, the final ES would be produced in a number of volumes. These would be expected to include the following:

- Volume 1 Non-Technical Summary: this document would summarise the main elements of the Project and the significant environmental effects identified through the EIA process. It would be written in plain english for a non-technical audience;
- Volume 2 Main Text: this document would detail the findings of the EIA. It would include all the chapters listed in paragraph 17.2.3 including a summary of the Scoping Opinion and consultation feedback;
- Volume 3 Figures: all the figures referred to within Volume 2 would be reproduced here; and,
- Volume 4 Appendices: this would contain accompanying reports or documents to support Volume 2.

17.2.2 The Scoping Opinion given by the Planning Inspectorate will confirm the topics, and the receptors and potential effects within each topic, which are scoped in or scoped out of the EIA. The structure of the ES would reflect these topics but it is currently assumed that it will follow a similar structure to this Scoping Report.

17.2.3 A receptor-based approach would be applied. Potential effects associated with the generation of noise, dust, traffic and waste would be contained within technical notes in the appendices. The findings for these topics would be addressed within the chapters covering the receptors that would be affected by them, such as people and biodiversity. It is expected that the following chapters would be included within the ES:

- Chapter 1: Introduction
- Chapter 2: Regulatory Context
- Chapter 3: Description of the Development
- Chapter 4: Design Evolution
- Chapter 5: Consultation
- Chapter 6: Impact Assessment Methodology
- Chapter 7: Biodiversity
- Chapter 8: Water
- Chapter 9: Historic Environment
- Chapter 10: Landscape and Visual Effects
- Chapter 11: Soils and Geology
- Chapter 12: Land Use
- Chapter 13: People and Communities
- Chapter 14: Health impacts

- Chapter 15: Major Accidents
- Chapter 16: Cumulative Effects
- Chapter 17: Next Steps
- Chapter 18: References

17.2.4 Within each of the topics, a number of aspects have been scoped out at the present stage. It is anticipated that the Scoping Opinion would reflect this.

17.3 Forward Programme Overview

17.3.1 This document forms the Scoping Report which will be submitted to the Planning Inspectorate (PINS) as part of the requirements under the Infrastructure (Environmental Impact Assessment) Regulations 2017 (as set out in Chapter 1 – Introduction). PINS will scrutinise the report, take account of comments provided by statutory and non-statutory consultees, and provide a Scoping Opinion. The Scoping Opinion will confirm which topics and issues are to be scoped in or out of the EIA process.

17.3.2 Once a Scoping Opinion has been received, the EIA process would continue, by investigating those topics scoped into the EIA. The methodology to be used for the assessment is outlined in Chapter 6 of the Scoping Report and further refined within each topic chapter.

17.3.3 All topics scoped in would be investigated using a variety of desk-based study, surveys, consultation and engagement. The design of the pipeline would continue to be refined to reduce effects and avoid certain receptors. This is an ongoing process commenced at the start of the Project during corridor selection, through scoping, and will continue through to the production of the ES and the application for development consent.

17.3.4 Assessments will be made of expected environmental effects and their likely significance, and supported using the methods developed during the scoping process. Mitigation and enhancement measures would be identified and discussed with consultees. The residual effects of the Project would then be presented in the ES.

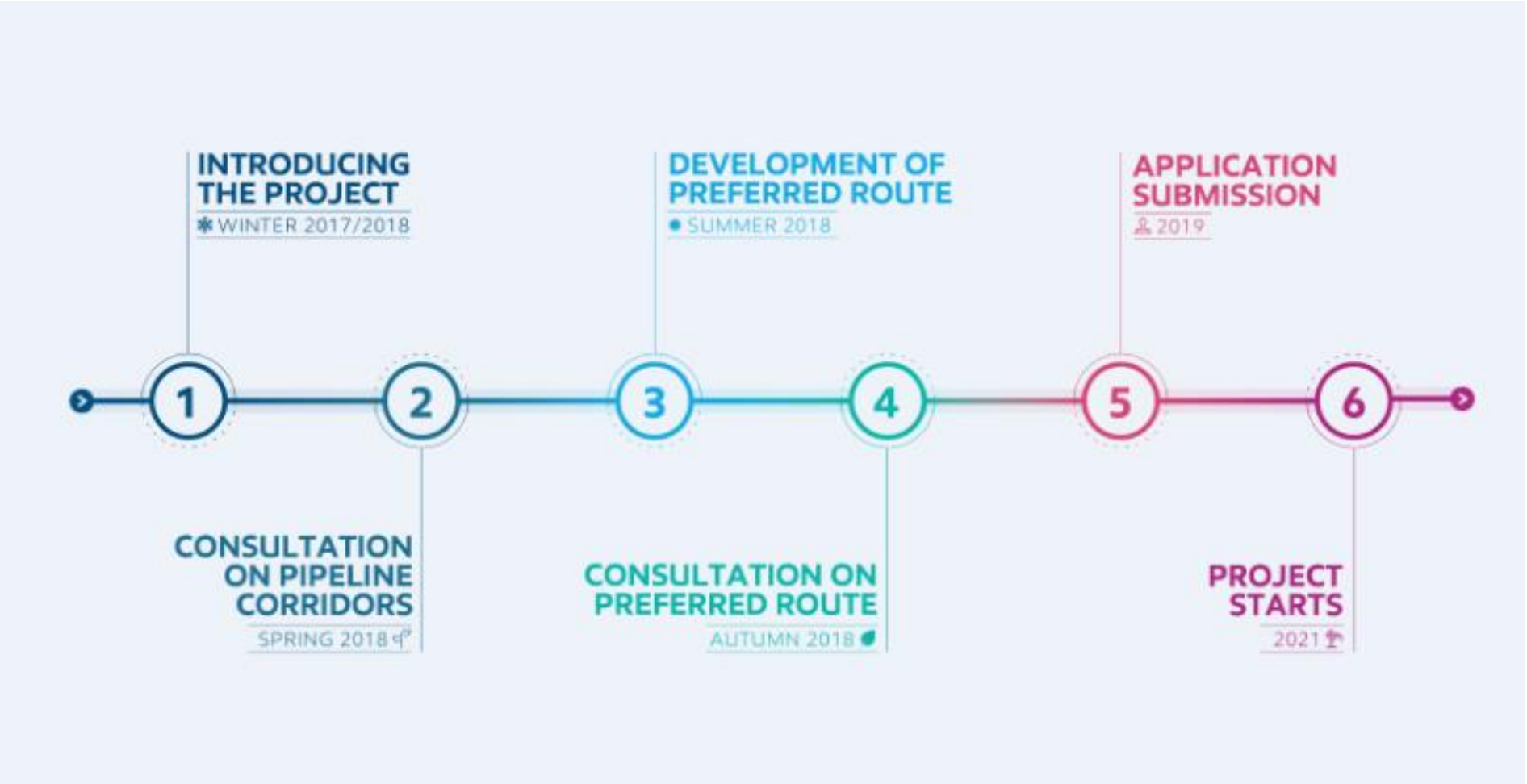
17.3.5 A PEIR will be produced in parallel with this process. The purpose of the PEIR is to inform the general public and consultees of the Project and its potential significant effects. It will help inform the statutory consultation events and meetings planned for autumn 2018. Feedback from these events and meetings would be taken into account in the EIA process to inform design and identify appropriate mitigation and enhancements.

17.3.6 The ES would be produced in 2019. The ES is the report of the Project's EIA work including scoping, consultation, surveys, data searches, assessment and design improvements. It documents the EIA process and the conclusions as to possible significant effects resulting from the Project. It explains mitigation measures to reduce the effects and details any residual significant effects.

17.3.7 The ES would be submitted to the Secretary of State with the application for development consent. The ES would then be considered along with other application documentation and representations. Should the Project be consented, a Development Consent Order (DCO) would be issued, with construction of the pipeline expected to commence in early 2021. More detail of the construction programme is given in Chapter 3.

17.3.8 Figure 17.1 illustrates the expected Project timeline.

Figure 17.1. Project Timeline



17.4 Consultation and Engagement

17.4.1 The Project will hold a second consultation in autumn 2018. This is the statutory consultation and will present the Project as it is intended to progress to the application for development consent. It will give local residents, elected representatives and organisations the opportunity to understand, consider and respond to the proposals, and will include the PEIR.

17.4.2 Consultation may take the form of exhibitions in easy to access public locations along the preferred route. Dates for the exhibitions would be published in advance. The consultation and exhibitions will be promoted through local advertising, press releases and posters.

17.4.3 Consultation materials may include a consultation brochure, leaflet, and map book. All information will be available on the Project website www.slpproject.co.uk.

17.4.4 An independent company will review and analyse all consultation responses. A report will be produced highlighting key themes and topics raised. These findings will then contribute to the EIA process to inform assessments and decisions.

17.4.5 Discussions will continue to be held with key regulators and stakeholders to gain expertise and local knowledge on various topics such as methodologies, information, mitigation and enhancement proposals. These include (but are not limited to) the Planning Inspectorate, Natural England (NE), the Environment Agency (EA), Historic England (HE), South Downs National Park Authority, Wildlife Trusts, Hampshire and Surrey County Councils and the relevant district councils.

17.4.6 Table 17.2 provides a list of the main consultees who would be engaged with during the preparation of the PEIR and ES. This is a non-exhaustive list and would be expanded as appropriate as the EIA process continues.

Table 17.2 Project consultees.

Consultee	Key Disciplines
Environment Agency	Water, Soils and Geology, Biodiversity (aquatic ecology)
Natural England	Biodiversity, Water, and Soils and Geology
Historic England	Historic environment
South Downs National Park Authority	Landscape, Ecology, Soils and Geology, and Heritage
Hampshire County Council Surrey County Council	Landscape, Soils and Geology, Ecology, Historic environment and Water (flood risk)
District/Borough/Parish Councils (Various)	Biodiversity, People and Communities (recreation, land use), Historic environment, Landscape, Water (drainage), Noise, Traffic, Waste.
National Trust	Landscape, Biodiversity, Heritage
Water Companies	Water (hydrogeology)
Wildlife Trusts	Biodiversity
Highways England	Transport
Transport for London	Transport
Network Rail	Transport

Consultee	Key Disciplines
Basingstoke Canal	People and Communities (recreation), Heritage, Biodiversity
London Boroughs and County/ Unitary highway authorities.	Transport
SSSI landowners	Biodiversity, People and Communities (recreation)

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Chapter 7 Biodiversity

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Appendix 1 Outline Code of Construction Practice

Appendix 2 Regional and Local Planning Policies

Appendix 3 Scoping Survey Methodology Report

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Appendix 9 Cumulative Assessment Long List

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Appendix 1
Outline Code of Construction Practice

Scoping Report Volume 1

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A1. Outline Code of Construction Practice

A1.1 Introduction

CoCP Purpose

A1.1.1 The Code of Construction Practice (CoCP) will be an agreed minimum set of principles that the Contractor will comply with. It will form the basis of the Contractor's Construction Environmental Management Plan (CEMP).

A1.1.2 The CoCP will provide general, project-wide measures and practices that will be expected to be adopted throughout construction of the Project where appropriate. Site specific control measures will be included within the CEMP.

A1.1.3 The CoCP will provide a consistent approach to the control of construction activities for the Project. It will describe a series of general measures and practices that will be implemented by Esso and/or its Contractor in the construction of the Project with the aim of controlling and mitigating potential impacts upon people and the environment. Esso will be responsible for compliance with the CoCP.

A1.1.4 The CoCP will be produced in conjunction with the Environmental Statement (ES) and will provide additional information on the mitigation and control of construction impacts. It will be one of a number of documents submitted with the application for development consent and should be read in conjunction with those other documents. The CoCP will be secured through a DCO Requirement.

A1.1.5 The CoCP is incomplete at the current stage of the Project, and this outline aims to provide an indication of its envisaged structure.

A1.1.6 Section A1.2 below gives an overview of the envisaged content.

A1.1.7 Sections A1.3 – A1.8 outline the likely mechanisms and documents, including the CEMP, which would be applied during construction, and how these relate to each other.

A1.1.8 Sections A1.9 – A1.24 provide some examples of measures which may be included in the CoCP. Chapter 4 of the Scoping Report lists all mitigation measures which are assumed for the purposes of scoping.

Overview of CoCP Content

A1.1.9 The CoCP will include:

- An outline of the construction activities and schedule.
- A description of the various mechanisms and documents that will manage and control potential environmental impacts during the construction phase.
- A description of general site operations, including information on working hours, lighting, fencing/security and construction site layout.
- Sections describing relevant measures and mechanisms for each type of potential environmental effect, including:
  - Avoidance of nuisances and incidents, and pollution prevention;
  - Biodiversity;
  - Water and Drainage;

- Historic environment;
- Landscape and visual;
- Waste and contamination;
- Land use, minerals and soils;
- Air quality;
- Noise and Vibration;
- Traffic Management and Public Access.

A1.2 Environmental Management

Introduction

A1.2.1 During the construction phase the potential environmental impacts and risks associated with the Project will be managed and controlled via a number of mechanisms and documents.

A1.2.2 The CoCP is intended to be an overarching document, setting out the requirements for production of additional mechanisms and documents, as well as including general measures to be applied.

A1.2.3 The suite of mechanisms and documents will be designed to identify relevant environmental mitigation measures and to ensure that such measures are implemented. These control mechanisms and documents are anticipated to take the form outlined below.

Environmental Management System

A1.2.4 The Contractor will be required to operate a certified Environmental Management System (EMS) to ensure compliance with environmental requirements.

A1.2.5 The EMS will include processes and procedures for managing compliance, training, monitoring, auditing and management of the Contractor's environmental performance. The aim of the EMS is to aid in the improvement of the Contractor's environmental performance, and therefore regular reviews and audits will be required.

Environmental Mitigation Measures

A1.2.6 A number of mitigation measures that will reduce potential environmental impacts will be identified through design and assessment of this project. Mitigation incorporated into the project design and additional mitigation measures identified in the ES will be captured in a Register of Environmental Actions and Commitments (REAC), which will form part of the ES.

A1.2.7 The REAC will also identify more general, project-wide measures, such as application of the relevant good practice guidance, where applicable. The CoCP will expand on these more general measures, setting out the requirement on the Contractor to implement them.

A1.2.8 As well as the above and any other provisions and Requirements within the Development Consent Order (DCO), the Contractor will be required to comply with all relevant legislation. This will include compliance with a number of consents, permits and licences.

Construction Environmental Management Plan

A1.2.9 The Contractor will be required to produce a CEMP. This will be produced by the Contractor in advance of construction.

A1.2.10 The CEMP would explain the Contractor's systems, including their EMS, to be used during the construction phase, to control and monitor its activities to mitigate environmental impacts and if necessary introduce any corrective actions.

A1.2.11 This would include ensuring that the commitments from the REAC, the CoCP, the DCO Requirements and any other consents are fully complied with and monitored.

A1.2.12 It is expected that the CEMP would explain how the activities of sub-contractors would also comply with its requirements.

A1.2.13 The CEMP would be expected to include any subsidiary plans such as for the management of waste and soil, landscape reinstatement, and ecological mitigation and monitoring.

A1.2.14 The CEMP would likely remain a 'live' document to be reviewed and updated on a regular basis by the Contractor as they become aware of new environmental issues or mitigation measures that arise.

Contractor's Method Statements

A1.2.15 It is anticipated that the Contractor would provide a series of method statements outlining the procedures that would be undertaken to complete construction activities and address environmental issues. The number of construction activities subjected to this process cannot be defined as yet, but could include site preparation, pipe-laying, trenchless crossings and reinstatement.

A1.2.16 Each method statement would include the measures to be undertaken to meet the requirements outlined in the CEMP.

Supervision

A1.2.17 The Contractor would be expected to appoint personnel that are suitably qualified and experienced to supervise the works. It is anticipated that a professionally qualified Environmental Manager would be appointed for the duration of the construction phase, along with a qualified and experienced Environmental Clerk of Works. These would be supported by specialists as required.

A1.3 Example Measures and Mechanisms

Introduction

A1.3.1 This section provides some examples of measures which may be included in the CoCP. This is not an exhaustive list of the anticipated CoCP content, and is provided for illustrative purposes. Chapter 4 of the Scoping Report lists all mitigation measures which are assumed for the purposes of scoping.

Working Hours

A1.3.2 Typical working hours will be stated, and also the circumstances where work outside of these hours may be required, for example:

- The delivery of pipe sections or abnormal loads which may need to be delivered outside of the normal working hours to avoid excessive congestion on the road network;
- Some trenchless techniques, which once started, require continuous operation;
- Activities such as some road crossings which if undertaken at night will reduce risks to road users and the construction workers.

Lighting

A1.3.3 Site compounds, storage areas and specific work areas may require lighting to ensure their safety and security, especially in the winter months. Where night working is required, continuous lighting will also be required.

A1.3.4 The CoCP will set out measures or standards to reduce the intrusion of light into adjacent properties and habitats to prevent unnecessary disturbance to local residents, wildlife, railway operations and passing motorists.

A1.3.5 This may include for example the use of motion sensors or timers to prevent unnecessary usage.

Fencing/Security

A1.3.6 Construction working areas will be appropriately fenced to prevent access from unauthorised people and from animals.

A1.3.7 The CoCP may include guidance or requirements on the selection of fencing, the need for other security measures such as CCTV, and fencing inspection and removal.

Avoidance of nuisance and incidents

A1.3.8 To reduce the risk of nuisance or environmental incident, the CoCP is likely to set out a number of good housekeeping measures to be implemented by the contractor at compound sites. These could include:

- Regular inspections and collection of any waste or litter found on site.
- No discharge of site runoff to ditches, watercourses, drains or sewers without appropriate treatment and agreement of the appropriate authority;
- The location of site offices to avoid overlooking residential property;
- Management of staff/vehicles entering or leaving site of site, especially at the beginning and end of the working day;
- Avoidance of use of loudspeaker systems or playing of radios;
- Suitable signage and parking control to reduce inappropriate parking especially in residential areas.

Pollution Prevention

A1.3.9 The CoCP is likely to include a requirement for the Contractor to outline the actions and measures to control the risk of a pollution incident either directly from the construction works or due to external factors such as extreme weather.

A1.3.10 These would be expected to include measures to reduce the risk of a pollution incident occurring, as well as proactive actions to ensure that any pollution incident that did occur would be controlled and managed effectively to reduce or avoid any adverse impacts on the environment. This would include the timely and appropriate reporting of any incident to the required parties.

Biodiversity

A1.3.11 The CoCP is likely to require the Contractor to implement appropriate measures to mitigate the impacts to habitats and species from the works. It is expected that control measures to be implemented by the Contractor could include:

- An Environmental Clerk of Works (ECoW) appointed to observe construction activities.
- Compliance with the requirements of any protected species licences.
- Measures such as fencing used to ensure existing vegetation and habitats both within the working area and directly adjacent, are retained and protected where practical.
- Adherence to specific identified seasonal constraints within the construction schedule such as breeding bird season.
- Measures implemented to prevent the spread of invasive plant species.

Water and Drainage

A1.3.12 The CoCP would require the Contractor to implement measures to protect surface and ground water resources, including giving due regard to the relevant industry guidance.

A1.3.13 The CEMP is envisaged to include location-specific details on de-watering, settlement lagoons, land drainage, discharge points, flood risk areas and abstractions.

A1.3.14 Other measures which may be set out in the CoCP include:

- All activities that would require an Environmental Permit to be agreed directly with the Environment Agency.
- Implement measures to prevent silt from being washed into water bodies.
- All works within or adjacent to watercourses to be carried out in accordance with the requirements agreed with the (specified) relevant body.
- A series of measures to protect the water environment during open cut watercourse crossings and installation of vehicle crossing points, such as installation of pollution booms, provision of spill kits and reinstatement requirements.

A1.3.15 The CoCP will include requirements on the Contractor which would avoid significant increase in flood risk, such as the siting of compounds, the surfacing of access tracks and compound areas, and subscription to the EA's Floodline service.

A1.3.16 The CoCP will also address drainage and private water supplies, and could include measures such as:

- The Contractor will ensure that plans of all known field drains and other drainage systems are available on site.
- The drainage will be installed prior to the main construction works and will ensure the integrity of agricultural drainage systems and any other private drains.
- All new drainage outfalls will have necessary regulatory consent prior to installation.
- Quality monitoring of private water supplies will be undertaken where appropriate.

Historic Environment

A1.3.17 It is expected that the CoCP would require the Contractor to implement measures to mitigate impacts upon heritage and archaeological features, both known and those that have yet to be discovered.

A1.3.18 An Archaeological Written Scheme of Investigation (WSI) agreed with the relevant planning archaeologists would identify what archaeological investigation is required during the construction phase.

A1.3.19 The Contractor would likely be required to comply with relevant measures set out in the WSI. These could include measures to protect identified assets through fencing.

Landscape and visual, including trees

A1.3.20 The CoCP would require the Contractor to implement appropriate measures to mitigate the landscape and visual impacts of construction through the CEMP. In addition, it is expected that control measures to be implemented by the Contractor could include:

- Vegetation clearance and tree works to be supervised by a qualified ecological or arboricultural specialist as appropriate.
- Prevention measures, such as demarcation fencing, to be put in place to prevent damage to the landscape and landscape features including vegetation and structures, adjacent to the construction site by the movement of plant and vehicles.

- Measures to be taken to prevent the spread of invasive and non-native species. The Contractor should be aware of any such species that have been identified and surveyed.
- Hedgerows, fences and walls would be reinstated to match those that were removed, where possible.
- The CoCP may also include a requirement to follow specified guidelines for working near trees. Compounds, equipment, material storage would be kept an appropriate distance from adjacent trees.

Waste and Contamination

A1.3.21 It is expected that the Contractor would be required to outline the measures to be taken to reduce the volume of waste produced, including the application of the waste hierarchy.

A1.3.22 The Contractor would be required to be aware of any known sites which have confirmed or potential contamination. The works are expected to take place both in and adjacent to known areas of possible contamination such as licensed landfill sites and unlicensed filled pits.

A1.3.23 The CoCP would require the Contractor to introduce measures and processes in line with a qualitative risk assessment to protect construction workers, the wider public and the environment from contaminated material encountered. This could include measures such as additional dust suppression and containment barriers within the pipeline trench.

A1.3.24 Material considered to be contaminated would be suitably stored and contained to prevent potentially contaminated waters and sediments escaping.

Land Use, Minerals and Soils

A1.3.25 The land crossed by the majority of the route is dominated by rural land uses, in particular a mixture of arable and pastoral agriculture. There are also a number of areas under nature conservation management with several recreational uses.

A1.3.26 Measures within the CoCP to protect land use and soils could include:

- Reinstatement of land to the original land use after construction.
- Reinstatement of field boundaries severed by the works, whether hedges, fences or walls.
- Compliance with stated biosecurity guidance or measures to prevent the spread of animal or plant diseases.
- Soil would be reinstated *in situ*.
- Production and implementation by the Contractor of a Soils Handling and Management Plan which could include measures on handling, management, reinstatement and aftercare of soils, in line with the DEFRA Code of Practice for the sustainable use of soils on construction sites.

A1.3.27 Other measures to protect soils could include:

- Existing land drains would be identified and measures taken to avoid poor drainage affecting soil quality during and post construction.
- Reasonable precautions would be taken in relation to the handling and storage of soils, such as:

- the separate handling and storage of different soils, particularly topsoil and subsoil;
- handling soils that are in a suitably dry condition; and
- prevention of soil contamination with chemicals or other materials including weed species.

Air Quality

A1.3.28 A range of air quality control measures would be set out in the CoCP, as appropriate to the particular activities being undertaken. For example, the Contractor may be required to implement measures including dust monitoring and inspection.

A1.3.29 The Contractor could be required to record dust and air quality complaints and incidents, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.

A1.3.30 Measures to reduce air quality and dust impacts from plant and vehicles could include:

- Using vehicles and plant fitted with catalysts, diesel particulate filters or similar devices where practicable;
- Ensuring that plant and vehicles are well maintained and operated in accordance with manufacturer's recommendations;
- Handling and transfer of materials such as surplus soil, imported bedding material, cement based grouts and drilling additives will be controlled to reduce dust generation;
- Materials will be damped down when excessive visible dust is observed;
- An appropriate speed limit is to be enforced for vehicles travelling along the pipeline working area to minimise dust generation.

Noise and Vibration

A1.3.31 The CoCP would require the Contractor to implement measures to control and limit noise levels, so far as would be reasonably practicable. Detailed measures for the control of noise and vibration would be laid out in the CEMP. General measures included within the CoCP could include:

- Construction works to be confined to the stated working hours where possible.
- Unloading and pipe storage areas within compounds to be located away from residential properties where practicable.
- Audible vehicle reversing sirens, to normally be set to as low a setting as is compatible with safety requirements.
- Designated access routes to compound sites to be clearly signed to ensure all construction traffic uses the approved routes

Traffic Management and Public Access

A1.3.32 The CoCP would require the Contractor to implement measures to reduce the traffic disruption to local people and users of the local road network from increased traffic levels generated by the construction activities. This could include the production of a construction traffic management plan (CTMP) which would consider the traffic generated by the construction vehicles, as well as managing diversions and closures due to works within the highway network. The CTMP could include:

- Location plans showing the compounds, pipelaying working area and all access points into the working area.
- Traffic Route Plans showing the routes that all construction traffic will utilise from the trunk road network.
- Plans showing likely temporary road closures from construction activity such as road crossings, and the diversion routes to be adopted.
- A schedule of access route restrictions including load limits, timing restrictions and prohibited routes.

A1.3.33 The working area will intersect with a number of permissive and statutory Public Rights of Way (PRoW) and areas of open public access.

A1.3.34 For PRoW that cross the working area, the CoCP is likely to describe measures to allow their continued use where safe and practicable. This could include using a priority gate system and some temporary diversions.

Further development of the CoCP

A1.3.35 As design, assessment and engagement continues over future months, the CoCP will be developed in full and will be submitted as part of the application for development consent.

Appendix 2
Regional and Local Planning Policies

Scoping Report Volume 1

JACOBS

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A2. Regional and Local Planning Policies

A2.1 Introduction

A2.1.1 An application for an Order granting development consent is not subject to Section 38(6) of the Planning and Compulsory Purchase Act 2004. However, the Secretary of State must take Development Plans into consideration if the Secretary of State considers they are 'both important and relevant' to the decision.

A2.1.2 The following regional and local planning policies have been considered during the production of the Scoping Report. Whilst National Policy Statements (NPS) EN-1 and EN-4 remain the prime decision making documents, where they do not provide guidance, the following may also be considered important and relevant guidance that may require consideration by the decision making authority. At this stage it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State and it is included for completeness to allow the Secretary of State to make such a determination. In considering these policies, it should be noted that the Secretary of State, rather than the Local Authorities or SDNPA, is the decision maker for the Project.

A2.2 Regional Planning Policy

The London Plan

A2.2.1 A very small part of the Order Limits for the route extends into the London Borough of Hounslow and therefore, the strategic planning context in London applies to that part of the project.

A2.2.2 The London Plan is the strategic plan for London, setting out an environmental, economic, transport and social framework for development. The current London Plan was adopted in March 2016. The Mayor of London is currently in the process of developing a new London Plan and a consultation period on the draft local plan concluded in March 2018. Examination in Public will now take place. Until the new London Plan is adopted in policy, the current 2016 Plan will remain part of the adopted Development Plan. However, the Draft London Plan is a material consideration and gains more weight as it moves through the process to adoption.

A2.3 Local Planning Policy

A2.3.1 The application area for the Project is located within both upper and lower tier Local Planning authorities as well as a National Park Authority. This Appendix gives details of these relevant authorities and outlines the statutory Development Plan Documents for each area. Weight can also be given to policies in emerging Plans according to their stage of preparation. As such, relevant emerging policy documents will also be listed in this section.

London Borough of Hounslow

A2.3.2 The West London Terminal storage facility is located in the London Borough of Hounslow. The statutory Development Plan for the London Borough of Hounslow consists of:

- Hounslow Local Plan 2015 to 2030 volumes 1-2;
- Local Plan – Policies Map.

A2.3.3 Hounslow Borough Council are currently reviewing their Local Plan. The new Local Plan comprises the following documents:

- Draft West of Borough Local Plan review;
- Draft Great West Corridor Local Plan review;
- Draft Amendments to the existing Local Plan 2015.

Spelthorne Borough Council

A2.3.4 The statutory development plan for Spelthorne Borough Council comprises the following documents:

- Core Strategy and Policies DPD (2009);
- Allocations DPD (2009);
- Adopted Policies Map (2009).

A2.3.5 Spelthorne Borough Council are in the early stages of developing a new Local Plan covering the period 2020 – 2035. Consultation on an Issues and Options document closed on 26 June 2018.

Runnymede Borough Council

A2.3.6 The statutory development plan for Runnymede Borough Council comprises the following documents:

- Runnymede Local Plan 2001 (Saved Policies).

A2.3.7 Runnymede Borough Council are currently developing a new Local Plan for the area. A first period of consultation on their Draft Local Plan 2030 concluded on 22 February 2018 and a second consultation ended on 29 June 2018.

Surrey Heath District Council

A2.3.8 The statutory development plan for Surrey Heath District comprises the documents:

- Core Strategy & Development Management Plan Document (2012);

- Policies Map (2012);
- The 2000 Local Plan (extant saved policies);
- Camberley Town Centre Area Action Plan (2011-028) and Policies Map.

A2.3.9 Surrey Heath District Council consulted on a draft Local Plan from 4 June 2018 until 30 July 2018.

Eastleigh Borough Council

A2.3.10 The statutory development plan for Eastleigh Borough Council comprises the following documents:

- Eastleigh Borough Local Plan (2001-2011) (Saved Policies) and Proposals maps.

A2.3.11 Eastleigh Borough Council began a consultation of a draft Local Plan on 25 June 2018 and the consultation will close on 6 August 2018.

Winchester City Council

A2.3.12 The statutory development plan for Winchester City Council comprises:

- Local Plan Part 1 - Joint Core Strategy Adopted (2013);
- Local Plan Part 2 - Development Management & Allocations Adopted (2017);
- The Policies Map.

A2.3.13 A full review of the adopted Local Plan is due to commence in Summer 2018.

East Hampshire District Council

A2.3.14 The statutory development plan for East Hampshire District Council comprises the following documents:

- The Local Plan Second Review (2006) (Saved policies);
- Joint Core Strategy (Part 1 Local Plan);
- Housing and Employment Allocations (Part 2 Local Plan);
- The Local Plan (Part 2) Policies maps.

A2.3.15 East Hampshire District Council are currently at the early stages of developing a new Local Plan for the area covering the period 2017-2036. Consultation on the draft Local Plan is due to commence in early 2019.

Hart District Council

A2.3.16 The statutory development plan for Hart District Council comprises the following:

- Hart Local Plan 1996 - 2006 (Saved Policies), and Policies Map.

A2.3.17 The Council submitted the Draft Local Plan Strategy and Sites 2016-2032 Proposed submission version for Examination on 18 June 2018.

Rushmoor Borough Council

A2.3.18 The statutory development plan for Rushmoor Borough Council comprises the following documents:

- Saved policies of the Rushmoor Local Plan Review (2000);
- The Rushmoor Plan – Core Strategy 2011-2027.

A2.3.19 Rushmoor Borough Council are currently in the process of developing a new Local Plan for the area which will cover the period 2014 – 2032. The emerging Local Plan was submitted to the Planning Inspectorate for examination in February 2018 and comprised the following documents:

- Draft Submission Local Plan (June 2017);
- Policies map final proposed changes (June 2017).

A2.3.20 Examination hearings have taken place but the examination has not yet closed.

South Downs National Park Authority (SDNPA)

A2.3.21 The SDNPA is covered by the saved policies of 11 inherited Local Plans and 5 adopted Joint Core Strategies. Until a new Development Plan is adopted, the statutory development plan for the South Downs National Park comprises the following:

- Adur District Local Plan (1996),
- Arun District Local Plan (2003),
- Adopted Brighton & Hove Local Plan 2005 (Saved Policies),
- Chichester District Local Plan First Review (1999),
- Eastbourne Borough Plan (2003),
- Mid Sussex Local Plan (2004),
- East Hampshire Local Plan: Second Review (2006),
- The Local Plan Part 1 (Joint Core Strategy) (2014),
- Lewes District Local Plan (2003),
- Lewes District Joint Core Strategy,
- Wealden Local Plan (1998),
- Wealden District (Incorporating Part of the South Downs National Park) Core Strategy Local Plan,
- Winchester District Local Plan Review (2006),
- Local Plan Part 1 (Winchester Joint Core Strategy),
- Worthing Local Plan (2003) (saved policies not deleted by the adoption of the Core Strategy),

- Worthing Core Strategy (2011).

South Downs Local Plan

A2.3.22 In April 2018 the South Downs National Park Authority submitted its first Local Plan for the entire National Park for examination. The Plan was the pre-submission version plus proposed changes. No date has yet been set for that examination.

A2.3.23 The Plan acknowledges that growth requires strategic infrastructure upgrades. However, it identifies concerns that these can be harmful to the natural environment and landscape and contrary to the first purpose of the National Park. Within the emerging local plan for the SDNP, Core Policy SD3: Major Development is of particular importance to the delivery of the replacement pipeline.

A2.3.24 Policy SD3 requires strategic infrastructure and other 'major development' proposals be accepted only in exceptional circumstances. Proposals are assessed against a series of considerations which are consistent with paragraph 116 of the NPPF. Once a proposal has been assessed against these considerations, the authority will make a decision. This is based on whether there is a reasonable expectation that exceptional circumstances exist, and that it can be demonstrated that development would be in the public interest.

A2.3.25 If development is approved, policies seek the highest level of design, mitigation and improvements to the natural beauty, wildlife and cultural heritage of the National Park.

A2.3.26 Policy SD3 states:

- *'In determining what constitutes major development the National Park Authority will consider whether the development, by reason of its scale, character or nature, has the potential to have a serious adverse impact on the natural beauty, wildlife or cultural heritage of, or recreational opportunities provided by, the National Park. The potential for adverse impact on the National Park will include the consideration of both the impact of cumulative development and the individual characteristics of each proposal and its context'.*
- *'Planning permission will be refused for major developments in the National Park except in exceptional circumstances, and where it can be demonstrated they are in the public interest. Consideration of such applications should include an assessment of:*

  a) The need for the development, including in terms of any national considerations, and the impact of permitting it, or refusing it, upon the local economy;

  b) The cost of, and scope for, developing elsewhere outside the designated area, or meeting the need for it in some other way; and

  c) Any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated'.
- *'If it is considered that exceptional circumstances exist and development would be in the public interest, all opportunities to conserve and enhance the special qualities should be sought. Development proposals should be sustainable as*

measured against the following factors:

- *Zero Carbon;*
- *Zero Waste;*
- *Sustainable Transport;*
- *Sustainable Materials;*
- *Sustainable Water;*
- *Land Use and Wildlife;*
- *Culture and Community;*
- *Health and Wellbeing.*

Surrey County Council

A2.3.27 County Councils are the authority in charge of transport, as well as minerals and waste policy.

A2.3.28 In 2016 Surrey County Council updated their third Local Transport Plan (LTP3), which contains policies to help the county meet their transport needs.

A2.3.29 The Surrey Waste Local Plan sets out the planning framework for the development of waste management facilities in Surrey. The current plan was adopted in 2008 - Surrey Waste Plan 2008. Surrey County Council are currently preparing a new Surrey Waste Local Plan which is due to be adopted in 2019.

A2.3.30 The Surrey Minerals Plan Core Strategy DPD, adopted in 2011, forms part of the Surrey Minerals Plan and provides strategic policies and site specific proposals for the extraction of silica, sand and clay for the period to 2026. The Core Strategy document is supplemented by two development plan documents:

- Surrey Minerals Plan Primary Aggregates DPD;
- Aggregates Recycling Joint DPD.

Hampshire County Council

A2.3.31 The Hampshire Minerals & Waste Plan (HMWP) was adopted in October 2013. It sets out the vision, objectives, spatial strategy and policies to enable the delivery of sustainable minerals and waste development in Hampshire up to 2030.

A2.3.32 The Local Transport Plan for Hampshire was adopted in 2011 and sets out the county's vision, objectives and policies with regard to transport. This plan is made up of the following statutory documents:

- Hampshire Local Transport Plan - Part A Long Term Strategy 2011-2031;
- Hampshire Local Transport Plan - Part B Three Year Implementation Plan 2014-2017.

A2.3.33 A review of relevant adopted and emerging planning policy has revealed that, beyond what would be expected to be contained within local planning policy, with the exception of Core Policy SD3: Major Development contained within the SDNP emerging Local Plan, there is no policy that could have a direct impact on the deliverability of the Project.

Appendix 3
Scoping Survey Methodology Report

Scoping Report Volume 1

Esso

JACOBS

Southampton to London Pipeline Project

Esso Petroleum Company Ltd.

Scoping Report Appendix 3 Environmental Survey Methodology Report

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Abbreviations

List of Abbreviations

Abbreviation	Definition
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
CSM	Conceptual Site Model
DCO	Development Consent Order
EA	Environment Agency
eDNA	Environmental DNA
EIA	Environmental Impact Assessment
EPS	European Protected Species
EPSML	European Protected Species Mitigation Licence
ES	Environmental Statement
GI	Ground Investigation
GIS	Geographical Information System
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, 3rd edition
HE	Historic England
HER	Historic Environmental Records
LiDAR	Light Detection and Ranging
LONI	Letter of No Impediment
NE	Natural England
NPS	National Policy Statement
SAC	Special Area of Conservation
SDNPA	South Downs National Park Authority
SLP Project	Southampton to London Pipeline project
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
WFD	Water Framework Directive
ZTV	Zone of Theoretical Visibility

1. Introduction

1.1 Project Overview

1.1.1 The Southampton to London Pipeline Project intends to replace 90km of Esso's 105km aviation fuel pipeline that runs from Esso's Fawley Refinery near Southampton to their West London Terminal storage facility in Hounslow.

1.1.2 This report supports the Scoping Report which is being submitted to the Planning Inspectorate to accompany a request for EIA Scoping Opinion for the Project.

1.2 Approach to the Environmental Survey Methodology Report

1.2.1 To meet the relevant requirements of the National Policy Statements EN-1 and EN-4, and the Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017, a range of environmental surveys are being proposed. These surveys will provide information to understand the environmental conditions within and adjacent to the proposed Order Limits of the Project. They will also help define the alignment of the replacement pipeline, and support the project design.

1.2.2 Surveys will be required to gather sufficient baseline information to identify and assess the potential significant environmental effects of the Project. The information will support the development of appropriate measures to reduce significant effects. Surveys may also be needed to obtain sufficient data for other legal, consenting or policy reasons. The intention is to ensure a proportionate and targeted approach to surveys; focused on areas where constraints may not be able to be avoided, or where sufficient existing baseline data cannot be obtained.

1.2.3 Where sufficient existing data are available which provide the necessary information to assess the likely significant environmental effects with sufficient confidence, the need for field surveys can be avoided. If a potential environmental effect of the development is not likely, not likely to be significant, and not likely to be a material consideration, e.g. due to the location, design, construction methods or any other measures secured to avoid an impact, the need for field survey can also be avoided.

1.2.4 The approach also draws upon:

- engagement with environmental regulators, including meetings (see Scoping Report, Chapter 5) and informal feedback on a draft Environmental Survey Strategy (March 2018) from Natural England, the Environment Agency and the South Downs National Park Authority in April/May 2018;
- ongoing design development, construction planning, and the identification of potential mitigation measures (including measures set out in Chapter 4 of the Scoping Report and to be included within a Code of Construction Practice (CoCP), which will be submitted with the application for development consent).

1.2.5 This approach aims to ensure the project team and stakeholders work together to reach a shared understanding with all parties, to enable a proportionate approach to surveys for the EIA.

1.3 Structure of the Report

1.3.1 Sections 2 – 6 of this report set out the proposed survey methodologies for the environmental topics identified below:

- Biodiversity;
- Landscape and Visual Impact Assessment;
- Cultural Heritage;
- Surface and Ground Waters;
- Soils and Geology.

1.3.2 Section 7 discusses next steps, including stakeholder engagement, design development, and the EIA process.

2. Ecology

2.1 Introduction

2.1.1 The proposed ecology survey methodologies have been prepared based on the design development undertaken to date. The results of preliminary desk studies and initial stakeholder consultation and engagement have also been taken into account.

2.1.2 The approach has made use of detailed desk study data, high-resolution digital aerial photography and GIS mapping. Where appropriate, field survey effort will be minimised by:

- influencing design and route options at all stages to avoid impacts;
- implementing embedded and good practice mitigation through the design process and future CoCP to avoid or reduce likely significant effects, for example through the use of buffer zones or minimising the construction working width at key locations; and
- making reasonable assumptions relating to the likely presence of protected species using the results of desk studies and professional judgment.

2.1.3 The proposed scope of field surveys has been influenced by the results of the desk study, professional judgment, and consultation and engagement with key stakeholders (e.g. Natural England (NE), the Environment Agency (EA), and county ecologists for Hampshire and Surrey (or the relevant Borough/District ecologists). This includes feedback from Natural England and the Environment Agency on a draft Environmental Survey Strategy in March/April 2018.

2.1.4 Field surveys are proposed to confirm the presence or likely absence of legally protected species and/or other notable species and habitats. These 'ecological receptors' are material considerations in the Development Consent Order (DCO) process.

2.1.5 The proposed field survey methodologies take into account the likelihood of impacts arising, and the predicted magnitude of effect. For example, in areas where impacts to species can be avoided or are identified as low risk, survey effort will be reduced accordingly. Conversely, in areas where impacts are likely or the magnitude of any effect will be high, greater survey effort would be applied. In all cases, justification will be provided to demonstrate why the proposed survey effort is considered to be proportionate.

2.1.6 The combined results of the desk study and field surveys will be used to inform the detailed design of the Project with the aim of avoiding or minimising adverse effects to important ecological receptors. Where adverse effects cannot be avoided or where the Project would likely breach relevant legislation in the absence of mitigation, appropriate mitigation strategies will be developed using the baseline information obtained.

2.1.7 The baseline information will also inform the Project's Environmental Statement, Water Framework Directive Assessment, Habitats Regulations Assessment, and related reports on protected and controlled species compliance, and ghost licences for protected species.

2.1.8 The section below describes the methodologies of the surveys proposed.

2.2 Botanical and habitat assessment

Desk study

2.2.1 An initial desk study will be undertaken to identify plants, vegetation or habitats potentially of importance for nature conservation. The desk study will generally be restricted to habitats and sites within 1km of the Order Limits. Where necessary, the study area will be extended to encompass sites with hydrological connectivity to the Project if these are located downstream of watercourse crossings or within the same catchment.

2.2.2 The desk study will draw on the following sources:

- Citations of relevant statutory designated sites (i.e. Special Areas of Conservation (SAC), Sites of Special Scientific Interest (SSSI), Ramsar wetlands of international importance, National Nature Reserves (NNR), and Local Nature Reserves (LNR)).
- Site descriptions of non-statutory designated sites (i.e. Sites of Nature Conservation Importance (SNCI), Sites of Importance for Nature Conservation (SINC), Local Wildlife Sites (LWS) and equivalents) along the consultation corridors (see Chapter 4 of the Scoping Report), if information on site features is available.
- Environmental records of notable botanical taxa and habitats, provided by local records centres (i.e. Hampshire Biological Information Centre (HBIC), Surrey Biological Information Centre (SBIC) and local botanical groups of relevance).
- All habitats will be mapped using high-resolution aerial photography and LiDAR obtained during a fly-over by a light aircraft. The aerial imagery will be converted to Phase 1 Habitat Survey maps using a GIS algorithm package. Following this, survey work for the Project will involve ground truthing. This will include the identification of potentially more valuable habitats not identified from desk sources, for example areas of rough grassland identified from aerial photographs that could be grassland of nature conservation value.

2.2.3 Notable habitats to be identified during the desk study will include:

- habitats listed on Annex I of the *Conservation of Habitats and Species Regulations 2017*; and
- habitats of principal importance, listed in accordance with Section 41 of the *Natural Environment and Rural Communities (NERC) Act 2006*.

2.2.4 Notable plant taxa to be identified during the desk study will include:

- species listed on Annex II of the *Conservation of Habitats and Species Regulations 2017*;
- taxa listed on Schedule 8 of the *Wildlife and Countryside Act 1981* (as amended);
- species of principal importance;
- nationally rare and scarce taxa (e.g. BSBI, 2017);
- red-listed taxa, such as those listed as ‘Near Threatened’, ‘Vulnerable’, ‘Endangered’ or ‘Critically Endangered’ on the vascular plant red list for England

(Stroh et al, 2014) or Great Britain (Cheffings et al, 2005); and

- locally notable taxa, such as vascular plants listed on county rare plant registers (e.g. Rand and Mundell, 2011).

2.2.5 On the basis of available information, it may not be possible to ascertain whether important plants, vegetation or habitats are actually present within the Order Limits or the Project's likely construction and operational zones of influence (see Chapter 7 of the Scoping Report for more information relating to zones of influence). In this instance, field surveys would be undertaken.

Water-dependent terrestrial habitats

2.2.6 Following the initial desk study, ecological features of nature conservation importance with possible hydrological connectivity to the Project will be assessed for the likelihood of being water-dependent. Such water-dependent terrestrial habitats ('wetlands') will be defined as (European Commission, 2003):

... heterogenous but distinctive ecosystems which develop naturally or are the product of human activities. Their biogeochemical functions depend on a constant or periodic shallow inundation by fresh, brackish or saline water, or saturation at or near the surface of the substrate. They are characterised by standing or slowly moving waters. Common features include hydric soils, micro-organisms, hydrophilous and hygrophilous vegetation and fauna, adapted to chemical and biological processes reflective of periodic or permanent flooding and/or water logging.

2.2.7 The identification of water-dependent terrestrial habitats will follow the risk-based approaches adopted by good practice guidelines, for example the UK Technical Advisory Group (UKTAG) on the Water Framework Directive (UKTAG, 2005), Wheeler *et al* (2009) and Brooks *et al* (2014). This identification process will be based on the ecology of plants and vegetation identified by the desk study which could be hydrologically connected to the Project, and any other available information, such as flood models available from the EA. This identification process will in particular seek to identify groundwater-dependent terrestrial ecosystems (GWDTE), defined as (European Commission, 2011):

Terrestrial ecosystems critically dependent on water flows and chemistries from a groundwater body.

2.2.8 GWDTE are potentially very sensitive to changes in ground conditions resulting from pipeline construction and operation (UKTAG, 2005), and the assessment will assign a preliminary groundwater dependency score using the following scale (UKTAG, 2004):

1 – Highly groundwater dependent feature.

2 – Moderately groundwater dependent feature, or may be groundwater dependent or have an element of groundwater supply (depending on context).

3 – Feature with little or no groundwater dependency.

2.2.9 Within any given site there is likely to be an assemblage of more or less water dependent vegetation. Given the complex nature of water-dependent vegetation and the likely poor spatial resolution of available information, the assessment will therefore adopt a precautionary approach and assess on the basis of the most water-dependent features at the most appropriate scale.

Field Survey

Short-listing

2.2.10 The results of the desk studies will form the basis for the selection of sites for detailed field surveys. Sites short-listed will consist of those of high, or potentially high, nature conservation importance. This will include sites identified as potentially water-dependent, based on them achieving an initial groundwater dependency score of 1 or 2.

2.2.11 The short-listing will involve the identification of areas for survey. This will vary depending on sensitivities of the plants, vegetation and habitats identified. For example, for dry heathland or dry grassland sites it may only be necessary to survey within the Order Limits; while surveys of more distant water-dependent habitats may be required if they are potentially hydrologically connected to the Project. Based on the desk study information obtained to date, the areas subject to field surveys are shown in Figure A3.1.

2.2.12 Where land access permits, short-listed sites would either be subject to a Phase 1 habitat survey and/or to detailed survey. Some sites may require an initial Phase 1 habitat survey following standard methodology (JNCC, 2010) if there is insufficient desk-study information to establish their importance. This would form the basis for identifying the need for further, more detailed surveys.

2.2.13 Detailed site surveys will catalogue and map in detail the plants, vegetation and habitats present, and will consist of two components:

- Botanical survey – the production of lists of plant taxa present within the survey area.
- Vegetation survey – the mapping and sampling of vegetation types across the survey area.

2.2.14 Field surveys will focus on vascular plants, and as such will be timed for the main growing season, i.e. May to August. Algae, mosses, liverworts, lichens and fungi will be included in the survey scope if the site is identified by the desk study as potentially important for these groups and if the Project has the potential to cause a significant effect to them. Surveys will be timed according to the phenology of these groups where Project constraints allow.

Botanical Survey

2.2.15 All vascular plant taxa encountered within the survey area will be recorded, with additional plant groups recorded as required. Each taxon recorded will be assigned a relative frequency using the DAFOR scale, where D = dominant taxon; A = abundant; F = frequent; O = occasional; and R = rare.

2.2.16 Particular note will be taken of notable species (as defined above), of species referred to in the citations of designated sites (as relevant), and of invasive non-

native species. The precise locality, habitat, population size etc. of such plants will be recorded.

Vegetation survey

2.2.17 The vegetation of the survey area will be sampled by quadrats based on National Vegetation Classification (NVC) survey methods (Rodwell, 2006). Sampling will focus on vegetation of nature conservation importance. Where practicable, sampling will also aim to be comprehensive spatially and in terms of the vegetation types and floristic variation across the respective study area.

2.2.18 Homogenous stands of vegetation within the survey area will be mapped in the field at an appropriate scale to understand the floristic variation and ecology of the survey area. Notes on stand composition, condition and situation will be taken, and all stands will be provisionally assigned to units of the published NVC (Rodwell, J. S. (Ed.), British Plant Communities, 1991-2000) or other authoritative works (e.g. Rodwell, et al., 2000, Wallace and Prosser, 2017). This assignment will be appraised according to the results of the analysis of the quadrat data gathered.

2.3 Watercourses

Desk Study

2.3.1 Data will be requested from Greenspace Information for Greater London (GiGL), Surrey Biodiversity Information Centre (SBIC), Hampshire Biodiversity Information Centre (HBIC) and the Environment Agency (EA). These data searches will encompass all available information relating to aquatic receptors (fish, macroinvertebrates, macrophytes) within a 1km buffer of the Order Limits. Where data is found to be lacking, the buffer may be extended to 5km for EA data. This will be necessary to determine the presence of highly mobile, migratory species that may not permanently reside within the Order Limits but move through the them at different times of the year.

2.3.2 Water Framework Directive data will be obtained from publically available open source data. Classifications for biological quality elements (fish, invertebrates and macrophytes) will be used to determine watercourse sensitivity, where known.

2.3.3 Results of walkover surveys of watercourses undertaken for the surface water assessments (see section 6 of this report) will be used to determine watercourse sensitivity and the potential for watercourse crossing points to support habitats and species of conservation interest within the study area.

Field study

2.3.4 The results of the desk study will form the basis for the selection of sites for further assessment. Sites short-listed will consist of:

- sites identified by watercourse walkover surveys (see section 6) as supporting areas of high potential biological habitat/species, that is not supported by baseline data;
- aquatic sites identified by the desk study as supporting high conservational value receptors; and
- watercourses identified by the EA specialists as high value.

2.3.5 Where the desk study allows the value of habitats and species to be determined from existing data alone, further surveys will not be undertaken.

2.3.6 The proposed construction methodology for watercourse crossings will influence whether specific watercourses require further field survey. Where impacts to watercourses will be avoided, for example through the use of trenchless construction techniques, these watercourses will not require further field survey.

2.3.7 Locations will be identified where the Project will cross watercourses using open-cut techniques and/or where a haul route crossing is required. The requirement to undertake further field surveys at these locations will be made on a case-by-case basis.

2.3.8 Where land access permits, the aim of the field surveys will be:

- to ground-truth the short-listed sites to ensure that further surveys at these locations are appropriate; and
- to confirm the presence or likely absence of high value aquatic receptors.

Macroinvertebrates

2.3.9 Macroinvertebrates will be assessed using standard methods comparable with Water Framework Directive (WFD) compliant methodologies (BSI, 2012). This requires multiple season sampling at each survey site (summer and autumn).

2.3.10 Macroinvertebrate samples will be placed in labelled sample buckets, preserved using industrial methylated spirit (IMS) and returned to the laboratory for species level macroinvertebrate analysis. Samples will be processed following WFD compliant procedures (Environment Agency, 2008) and identified to mixed taxon level. Biological metrics will be calculated using the WFD River Invertebrate Classification Tool (RICT) and include the following metrics:

- Whalley Hawkes, Pasiley & Trigg (WHPT) – assesses general degradation;
- Lotic-invertebrate Index for Flow Evaluations (LIFE) – assesses flow pressures;
- Proportion of Sediment-sensitive Invertebrates (PSI) – assesses sediment pressures; and
- Community Conservation Index (CCI) – assess conservation value.

2.3.11 Macroinvertebrates will be targeted from open cut crossings where the desk study indicates the potential for high quality/sensitive communities that cannot be accurately assigned a value due to insufficient data.

Fish

2.3.12 Fish will be sampled by means of electric fishing in accordance with the following guidelines developed by the EA (Beaumont et al., 2002; EA, 2001; EA, 2007) and BS EN 14011:2003 Water Quality: Sampling of Fish with Electricity (British Standards Institution, 2003). Quantitative data will be collected by means of three consecutive runs over 100m long transects.

2.3.13 All fish caught will be held in oxygenated recovery buckets before processing. Fish will be identified and measured to the nearest mm (fork length). Once all transects at each site are complete within each reach, fish will be returned alive to the

watercourse.

2.3.14 Surveys would be required once at each short-listed site, with data collected in the summer season (June – September).

Macrophytes

2.3.15 Due to the anticipated absence of protected or designated aquatic macrophytes within the Order Limits and buffer zone, no macrophyte surveys are proposed. Macrophytes will be assessed during the watercourse walkover surveys (see section 6 of this report) and as incidental records during macroinvertebrate and fish surveys as described above.

2.4 Reptiles

Desk study

2.4.1 Data will be requested from GiGL, SBIC, HBIC and the Surrey Amphibian and Reptile Group (SARG). These data searches will encompass all available information relating to reptiles within a 1km buffer of the Order Limits.

2.4.2 Aerial imagery (including high-resolution photographs obtained from a light aircraft survey) and habitat maps (e.g. those provided by HBIC and the MAGIC website) will be used to identify habitat with the potential to support rare reptiles or 'medium' or 'high' populations of common reptiles (HGBI, 1998), as detailed below.

2.4.3 The above data sources will also be used to identify all other areas of habitat with the Order Limits that might support 'low' populations of common reptiles (population ranges based on HGBI (1998) guidelines). These sites will not be subject to field surveys, as good practice mitigation in the form of habitat manipulation would be implemented prior to any construction activity commencing, to ensure legal compliance. Sites subject to this approach would need to satisfy the following criteria:

- the site must comprise of 'non-complex' habitats i.e. those with a uniform ground structure with low potential for extensive or buried refugia;
- the areas of construction impact would not exceed approximately 0.5ha; and
- there is suitable adjacent habitat to which displaced reptiles can move to.

2.4.4 Habitats that are sub-optimal for supporting reptiles (e.g. land subject to regular agricultural management or grazing, or amenity grassland) will be scoped out of the assessment and would not be subject to further surveys or mitigation.

2.4.5 This approach is considered proportionate given the localised and temporary nature of the proposed construction works.

Field surveys

Short-listing

2.4.6 The results of the desk study will form the basis for the selection of sites for further assessment. Sites short-listed will consist of:

- sites with confirmed presence of rare reptiles;
- sites with no recent or historic records of rare reptiles but with the potential to support these species (e.g. areas of suitable habitat that are contiguous with known rare reptile sites, or other sites supporting extensive tracts of heathland habitat);
- sites that have the potential to support medium or high populations of common reptiles due to the presence of large areas of high-quality habitat (e.g. heathland, rough grassland) likely to be affected by construction activity;
- sites supporting 'complex' or isolated habitat features where habitat manipulation would be an inappropriate mitigation technique.

2.4.7 All other sites with the potential to support low populations of reptiles would be mapped (but not surveyed) so that habitat manipulation mitigation could be implemented at a future date.

2.4.8 Where land access permits, the aims of the field surveys will be:

- to ground-truth the short-listed sites to ensure that further surveys at these locations is appropriate;
- to confirm the presence or likely absence of reptile species; and
- to estimate the population size of all reptile species present.

2.4.9 Based on the Order Limits and the results of the desk-study undertaken to date, the proposed locations of reptile field surveys are shown in Figure A3.2. Additional survey areas will be added if desk-study information or consultation responses suggests this is appropriate.

Presence/absence surveys

2.4.10 Where land access permits, surveys to confirm the presence or likely absence of reptiles will be undertaken in accordance with current best practice guidelines i.e. Froglife (1999).

2.4.11 The first stage of the survey would require ecologists to visit each site and lay 0.5m x 0.5m squares of roofing felt and/or corrugated tin (also referred to as artificial cover objects (ACO)). ACOs create an area for reptiles to shelter from predation or disturbance, and aid in heat absorption due to their ability to absorb greater amounts of heat than the wider environment and thus create an artificial hotspot.

2.4.12 ACOs will be placed in potential reptile "hotspots", often characterised as areas that catch a lot of sun that may also be close to cover, for example south-facing slopes or hedgerow bases. The number and density of ACOs will vary depending on the requirements of the survey and the landscape present but it is generally considered that 'more is better' for detection of reptiles. However, a minimum of one ACO every 10m (either in a grid or along a linear feature) will be distributed at each site (Froglife,

1999). The location of ACOs will be mapped using GIS and so will allow ecologists to accurately locate each item during future surveys and to record ACO-specific results.

2.4.13 Once the survey set-up is complete, all ACOs will be left on site for a minimum of seven days to allow time for them to 'bed-in' and for any reptiles to discover them.

2.4.14 Surveys would commence after the seven-day bedding-in period. To confirm presence or likely absence of reptiles at each site, a minimum of seven survey visits will be undertaken during suitable weather conditions. Surveys would cease at all sites with no records of reptiles after seven visits during suitable conditions.

2.4.15 Surveys will be undertaken between June and mid-October 2018, during the reptile active season and depending on the weather conditions and temperatures. Surveys will be undertaken when daytime temperatures are between 9ºC and 20ºC, with early morning or early evening visits preferred to midday/mid-afternoon visits (especially during the summer months) in order to avoid the hottest part of the day when reptiles are less likely to make use of ACOs. Weather patterns can also affect detection rates of reptiles. For example, a hot spell after prolonged cold weather can often yield high detection rates; similarly, showery weather after a dry period can have the same effect. Surveys will not be undertaken during rain or high wind.

2.4.16 During each survey visit, every ACO will be carefully viewed on approach to identify any reptiles basking on top before they flee. Once the ACO has been reached it would be carefully lifted and the area below inspected. All reptiles observed would be recorded.

2.4.17 In addition to ACO surveys, ecologists will undertake 'direct observation' surveys during each visit. This methodology is particularly useful for detecting sand lizard presence as this species is known to use ACOs relatively rarely (Sewell *et al,* 2013). As such, for sites likely to support this species, transect routes would be walked so that areas of optimal habitat could be surveyed. Particular attention would be given to features that may already be reptile hotspots on a site, for example large refugia in sunny locations or sandy areas close to cover.

2.4.18 Furthermore, surveyors will be vigilant for the presence of reptile sloughs (shed skin) which can often be identified to species level by looking at features such as shape, markings, scale size and form.

2.4.19 All surveys in locations with the known or suspected presence of rare reptiles would be undertaken by an ecologist with a Natural England survey licence (or an accredited agent). On a site where rare reptiles have not previously been recorded but were subsequently found during a survey, un-licensed surveyors would abandon the visit and all future surveys would be carried out by a licenced or accredited ecologist.

Population estimate surveys

2.4.20 A minimum of 15 visits would be undertaken at sites where reptile presence was confirmed during the first seven visits. These surveys would be undertaken in accordance with the methodology described above.

2.4.21 The results of these surveys would inform a population estimate for the site using guidance provided by HGBI (1998).

2.5 Great crested newt

Desk study

2.5.1 Historic records of GCN will be obtained from HBIC, SBIC and SARG. The study area for all data requests will extend 1km beyond the Order Limits.

2.5.2 The MAGIC website will also be reviewed to identify the locations of any European Protected Species Mitigation licences (EPSML) with respect to GCN within the study area.

2.5.3 A desk study will identify all waterbodies within 250m of the Order Limits.

2.5.4 Good practice guidance advises that suitable habitats within 250m of a breeding pond are likely to be used most frequently used by GCN, if there is an absence of barriers to movement. Small-scale losses of terrestrial habitat, especially over 250m from the breeding pond, are considered unlikely to have significant effects on GCN (English Nature, 2001). The 250m study area is considered proportionate due to the localised, temporary and reversible nature of pipelaying. The use of a 250m wide buffer is considered to be standard practice for pipeline projects of this nature.

2.5.5 Ordnance Survey (OS) maps, GIS OS MasterMap layers and aerial photography will be examined to identify all waterbodies within the 250m study area. Ponds located on the limit of the 250m study area, or just beyond it, will also be identified. Every pond identified will be given a unique reference number.

2.5.6 Where necessary, consideration will be given to assessing ponds beyond the 250m buffer. For example, if the terrestrial habitat likely to be affected by the Project would represent habitat likely to be of importance to a particular GCN metapopulation located beyond the 250m buffer, or if there is potential for a large population of GCN to be present due to high numbers of ponds within and beyond the 250m buffer. Such situations may benefit from bespoke survey effort depending upon the likely impacts as a result of any construction work that might take place.

2.5.7 All of the identified ponds will be assessed to determine whether any would be unsuitable for GCN and so could be ‘scoped out’ of the need for further survey. Waterbodies such as rivers, large lakes and canals will be scoped out due to their general unsuitability to support GCN (i.e. GCN are unable to create sustainable breeding populations in flowing water or very large bodies of water such as boating lakes or reservoirs) (Langton *et al,* 2001). Waterbodies identified as fishing ponds or fishing lakes will also be excluded from further assessment as fish predate GCN larvae and so significantly reduce the likelihood of GCN presence (English Nature, 2001). Waterbodies with significant physical barriers (e.g. motorways, A-roads, major railways, extensive areas of unsuitable terrestrial habitat) between them and the Order Limits will also be scoped out as the potential for GCN being present within habitats likely to be affected by the Project is considered to be very low.

2.5.8 All of the remaining waterbodies will be ‘scoped in’ and subject to field surveys where access is permitted.

Field surveys

Habitat Suitability Index (HSI) Assessment

2.5.9 Where land access permits, all ponds scoped in to the assessment will be subject to an HSI assessment in accordance with the methodology described by Oldham *et al* (2000). An HSI is a numerical index between 0 and 1, where 0 indicates unsuitable habitat and 1 represents optimal habitat. A score is calculated based on the results of ten suitability indices, all of which are factors thought to affect GCN presence. The resulting score categorises the pond based on its 'suitability' to support GCN and can be used to influence the decision as to whether further detailed survey work is required, as shown by Table A3.2.1 below.

Table A3.2.1 Habitat Suitability Index scoring system (Oldham *et al,* 2000)

HSI score	Suitability for GCN
<0.5	Poor
0.5 - 0.59	Below average
0.6 – 0.69	Average
0.7 – 0.79	Good
> 0.8	Excellent

2.5.10 In accordance with HSI methodology the following features will be assessed:

- geographical location;
- pond area;
- pond permanence;
- water quality;
- pond shading;
- number of waterfowl;
- occurrence of fish;
- pond density/other ponds within 1km;
- terrestrial habitat quality; and,
- macrophyte cover.

2.5.11 The results of the HSI survey will be used to inform the decision as to whether to undertake presence/likely absence surveys. In general, ponds that score greater than 0.5 will be scoped in for further surveys (i.e. 'poor' suitability ponds will generally be scoped out). However, it is recognised that GCN are often found in poor HSI scoring ponds and so professional judgement will typically be used to decide whether or not to undertake further surveys. For example, if a pond with 'poor' suitability to support GCN is located within close proximity to ponds with higher suitability for GCN, consideration would be given to scoping in the pond; or, if the pond scores more than 0.5 but supported features that would likely preclude the presence of GCN (such as a high population of fish), consideration would be given to scoping out the pond.

2.5.12 A record of all HSI scores and a justification for scoping in/out ponds will be kept using survey sheets on an iPad.

Presence/likely absence surveys

2.5.13 Where land access permits, all ponds within the study area considered to have potential to support GCN will be subject to environmental DNA (eDNA) surveys to confirm the presence or likely absence of the species. These surveys will be undertaken by a licensed and appropriately trained ecologist between 15th April and 30th June, as per Natural England guidelines (Natural England, 2015). These surveys will be undertaken before the application for Development Consent is submitted.

2.5.14 The survey protocol will be conducted in accordance with the guidance set out by Biggs *et al*. (2014). Twenty water samples will be taken from around the perimeter of each pond using a 40ml ladle, focusing on areas most likely to be used by GCN. The water samples will then be transferred to a Whirl-Pak bag. The Whirl-Pak bag will be gently shaken in order to mix any eDNA across the whole water sample. A pipette will then be used to transfer 15ml of water from the Whirl-Pak bag into each of six conical tubes containing a preserving fluid. Each conical tube will then be shaken vigorously for 10 seconds to mix the water sample and preservative. The six conical tubes will be labelled and sent to a Nature Metrics laboratory for analysis.

2.5.15 All samples will be analysed by scientists at a Nature Metrics laboratory. The laboratory will create a section of DNA known as a primer which is specific to GCN. The primer will bind to the GCN ribonucleic acid (RNA) (which acts as a messenger for carrying instructions from DNA for controlling the synthesis of proteins) and initiate the replication process. The polymerase Chain Reaction (PCR) is used to separate the strands of RNA, allowing primer bonding to occur. The DNA is then amplified in the chain reaction and analysed for GCN DNA presence. If GCN DNA is present, the primer reacts with it and produces readable levels of GCN DNA.

2.5.16 Conclusive results of this one survey would confirm the presence or likely absence of GCN in any given pond (Natural England, 2015).

Population estimate surveys

2.5.17 It is a Project commitment that there would be no loss of ponds, irrespective of whether GCN are present or not. Construction activity would affect terrestrial habitats only, with all areas being reinstated on completion of construction. It is a Project commitment that field boundaries consisting of hedgerows, trees or ditches will be crossing with a reduced construction working width of10m, where practicable. Additional outline information relating to embedded and good practice mitigation is described in Chapter 4 of the Scoping Report.

2.5.18 In most cases, population estimate surveys are not proposed as the impacts of the Project would be temporary, reversible and short-duration. As such, it is considered that in most instances all impacts to GCN can be confidently predicted and appropriate mitigation can be implemented without the need to estimate population size.

2.5.19 Population estimate surveys will be undertaken where a very high impact is predicted to a metapopulation of GCN, or if construction would affect an area that has potential to support ‘medium’ or ‘high’ populations of GCN. This will typically only apply to locations where construction activity would affect 'core' GCN habitat. Core habitat is

typically considered to be high quality habitat such as rough grassland, woodland, scrub or hedgerows within 50m of a GCN pond. Areas within 50m of GCN ponds but separated by dispersal barriers or sub-optimal habitats (e.g. extensive areas of hardstanding or arable fields) will typically not be subject to population estimate surveys. However, as large GCN populations have been recorded in apparently sub-optimal conditions, this assessment will be made on a case-by-case basis and will take account of all baseline information and advice from Natural England. The precautionary approach will also be adopted, as required.

2.5.20 The above approach is broadly consistent with that described in Natural England's survey guidance table (Natural England, 2015a) and aligns with Natural England's European Protected Species Licencing Policy number 4: *Appropriate and relevant surveys where the impacts of development can be confidently predicted*.

2.5.21 Where land access permits, ponds that require population estimate surveys will be subject to six survey visits between mid-March and mid-June, with at least three of these visits between mid-April and mid-May (although the survey window will be extended if weather conditions at the start of the season are poor). The surveys will be undertaken in suitable weather conditions. During each visit, bottle trapping and torch survey techniques will be used. All surveys will be undertaken by appropriately licensed ecologists in accordance good practice guidelines (English Nature, 2001). These surveys will be undertaken before the application for Development Consent is submitted.

2.5.22 The results of these surveys would inform a population estimate survey using guidance provided by English Nature (2001).

2.6 Bats

Desk study

Data search

2.6.1 An initial desk study will obtain data records relating to bats from GiGL, SBIC, HBIC and local bat groups from both Hampshire and Surrey. The data search will typically cover a minimum 1km buffer around the Order Limits. However, the search areas will be extended based on the capability and/or level of service provided by the data provider, and if considered necessary to inform the assessment.

2.6.2 The MAGIC website will also be reviewed to identify the locations of any EPSML with respect to bats within the study area.

2.6.3 The presence of statutory sites designated for bats within 10km of the Order Limits will also be assessed using the MAGIC website, in particular SACs.

Habitat suitability assessment and valuation

2.6.4 Aerial imagery (including high-resolution photographs obtained from a light aircraft survey) and habitat survey information (e.g. habitat maps provided by HBIC) will be used to identify habitat features with high potential to be used by commuting, foraging and roosting bats within or immediately adjacent to the Order Limits. The locations of these areas will be recorded using GIS mapping software.

2.6.5 An assessment will then be undertaken that determines the likely value of habitat for

bats within the Order Limits and the risk of encountering roosts. This valuation will influence the scope of field survey effort. The valuation will take account of the following:

- results of the data search;
- conservation value of relevant species found, or likely to be present, within the ZOI;
- core sustenance zones (CSZ) (a CSZ, as applied to bats, refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost);
- habitat type and connectivity, in particular water features, hedges, woodland and veteran trees;
- the risk of affecting trees with the potential to support roosts;
- the results of the ground-based roost assessments (see below); and
- the anticipated impacts based on the Order Limits and proposed construction activities within them.

2.6.6 The method makes use of guidance provided by Collins (2016) and Wray *et al* (2010) as well as professional judgment.

2.6.7 Table A3.2.2 describes how conservation value will be assigned.

2.6.8 Table A3.2.3 provides a framework used to value individual areas of habitat within the Order Limits for bats. The framework identifies features that might indicate a greater or lesser likelihood of roost presence. In each case, the habitat will be valued based on the highest category of relevance to that location.

2.6.9 Table A3.2.4 summarises the risk of impacting roosts as a result of construction activity.

Table A3.2.2: Categories of rarest, rare and common bats in England (taken from Wray *et al* (2010))

Rarity within range	Common name	Latin name
Rare (estimated population under 10,000)	Greater horseshoe	*Rhinolophus ferrumequinum*
	Bechstein's bat	*Myotis bechsteinii*
	Alcathoe's bat	*Myotis alcathoe*
	Greater mouse-eared	*Myotis myotis*
	Barbestelle	*Barbastella barbastellus*
	Grey long-eared	*Plecotus austriacus*
Rarer (population between 10,000 – 100,000	Lesser horseshoe	*Rhinolophus hipposideros*
	Whiskered	*Myotis mystacinus*
	Brandt's bat	*Myotis brandtii*
	Daubenton's bat	*Myotis daubentonii*
	Natterer's bat	*Myotis nattereri*

Rarity within range	Common name	Latin name
	Leisler's bat	*Nyctalus leisleri*
	Noctule	*Nyctalus noctula*
	Nathusius' pipistrelle	*Pipistrellus nathusii*
	Serotine	*Eptesicus serotinus*
Common (population over 100,000	Common pipistrelle	*Pipistrellus pipistrellus*
	Soprano pipistrelle	*Pipistrellus pygmaeus*
	Brown long-eared	*Plecotus auritus*

Table A3.2.3: Features that influence the value of habitats used by roosting bats

High value	Medium value	Low value
The location is well connected to wider areas of high value bat habitat e.g. ancient woodland, broadleaved woodland, parkland, wetland, hedgerows or grazed pasture.	The location has moderate or limited connectivity to wider areas of high value bat habitat; or the location is well connected to wider areas of moderate or lower value bat habitat e.g. intensively managed agricultural land, secondary woodland	Isolated trees in urban environments or intensively managed agricultural land with poor habitat connectivity to better foraging habitat.
The location is within the CSZ of the roost of a rare bat and supports trees with moderate or high potential roosting features.	The location is within the CSZ of the roost of a rarer bat species and supports trees with moderate or high potential roosting features.	The location may be within the CSZ of the roost of a rare or rarer bat but it only supports trees with low or negligible potential roosting features.

Table A3.2.4: The risk of impacts to roosts

High risk	Medium risk	Low risk
A tree with high potential to support roosts may be felled or is located within the immediate vicinity of construction activity.	A tree with moderate potential to support roosts may be felled or is located within the immediate vicinity of construction activity.	A tree with low or negligible potential to support roosts may be felled or is located within the immediate vicinity of construction activity.
A tree with high potential to support roosts may be isolated from commuting or foraging grounds as a result of construction activities severing well-used flight paths.	A tree with moderate potential to support roosts may be isolated from commuting or foraging grounds as a result of construction activities severing well-used flight paths.	A tree with low potential to support roosts may be isolated from commuting or foraging grounds as a result of construction activities severing well-used flight paths.

2.6.10 The above information will be illustrated geographically using GIS and a series of index values. The index values will be assigned based on a hierarchy of importance, as shown in Table A3.2.5.

2.6.11 An area will be considered to be of potential 'high' value for bats if it scores within the upper quartile of the total index value; of potential 'medium' value if it scored in the middle two quartiles of the total index value; and 'low' if it scored in the lower quartile. Professional judgement will also be used when determining habitat value.

2.6.12 The results will be used to inform the alignment of the pipeline and working areas within the Order Limits, the requirement for mitigation measures (e.g. minimising the construction working width) and the location and scope of field surveys.

Table A3.2.5: Index of values assigned to assess the likely risk of potential roost features being encountered

Criteria	Index value
Distance from the Order Limits	
>25m away	1
<25m away	2
Within the order limits	3
Habitat	
Urban, hard standing, roads	1
Arable, grassland (all) or un-identified habitats	2
Riparian	3
Broadleaved, mixed, conifer woodland and parkland	4
Ancient woodland	5
Number of overlapping bat CSZ	
0 – 10	1
10 – 50	2
50+	3
Within CSZ of roosts of rare bats	
All rare bat species	1

Field surveys

Preliminary ground level roost assessments

2.6.13 Where land access permits, a preliminary ground level roost assessment of all trees and structures likely to be affected by construction activity within the Order Limits will be undertaken. Ecologists will identify and record any structures and trees that contain potential roost features (PRF) which could be suitable for bats to roost in. These surveys will be undertaken before the application for development consent is submitted.

2.6.14 Based on the location of the Order Limits, the greatest risk of construction activity affecting bat roosts would arise through works to trees. PRFs of trees used as bat roosts include natural holes, woodpecker holes, cracks/splits in major limbs, loose bark, hollows/cavities, dense epicormics growth and, the presence of bird and bat boxes (Collins, 2016).

2.6.15 There are very few buildings or structures within the Order Limits that would likely be affected by construction activity. PRFs of buildings used as bat roosts include (but are not limited to): spaces between external weatherboarding/cladding and the timber frame or walls; gaps behind window frames, lintels or doorways including the main doors; cracks and crevices in timbers; gaps between ridge tiles and ridge and roof tiles, usually where the mortar has fallen out; gaps between stones or bricks; and gaps under broken or lifted roof tiles and lead flashing (Collins, 2016).

2.6.16 Surveys will be in accordance with current good practice guidelines (e.g. Collins, 2016; BSI, 2015; and Andrews, 2013). This involves a suitably experienced, and where necessary licenced, ecologist assessing each tree from the ground with the use of torches, binoculars and an endoscope. In general, features suitable for use by roosting bats will be searched, and any evidence indicating the presence of bats recorded and mapped. Evidence of bats include dead or live bats, presence of droppings, urine and fur oil stains, scratch marks around suitable crevices and feeding remains such as moth wings.

2.6.17 Consideration will also be given to the bat species that would have a preference for any features identified, in particular crevice dwelling species, where evidence of presence is often rare due to the inaccessible location of roosting sites.

2.6.18 The ecologist will assign a potential value based on the quality and quantity of bat roost features present. The locations of features with ‘high’ or ‘moderate’ roost potential (based on Collins, 2016), will be recorded on an iPad. Where possible, tree tags with unique reference codes will also be attached to each tree to aid future identification in the field.

2.6.19 Details of potential roost features will be recorded including the type of feature, its aspect, height, location and any other notable information which may aid further surveys.

2.6.20 The alignment of the pipeline and associated construction works areas would be informed by the results of the preliminary ground level roost assessment. The felling of trees with moderate or high potential to support roosts would be avoided, where practicable.

Climbing inspection surveys

2.6.21 Where land access permits, all trees with moderate or high roost potential, or those that are confirmed roosts, will be subject to climbing inspection surveys if direct impacts are anticipated as a result of construction activity (and if the trees are safe to climb). This will be assessed on a case-by-case basis but would likely account for scenarios where a pipeline alignment would be unlikely to avoid such trees.

2.6.22 Climbing inspection surveys involve climbing trees to inspect the PRF in more detail using qualified and licensed tree-climbing ecologists. The trees are climbed using ropes, harnesses and/or ladders. A detailed inspection of each PRF will be undertaken using high powered torches, mirrors and endoscopes to further assess

the feature's suitability as a roost and to search for evidence of bats (e.g. bat droppings, odour, audible squeaking or staining). Any droppings found would be collected and sent for DNA analysis at a Nature Metrics laboratory to confirm the species of origin.

2.6.23 Any PRF considered unsuitable for bats at this point will be scoped out and no further surveys would be undertaken of that feature and/or tree.

2.6.24 Where the potential for direct impacts to moderate or high potential trees have yet to be confirmed (e.g. due to uncertainty relating to the final alignment of the pipeline, or uncertainty relating to the removal of trees outside the construction working area due to health and safety reasons), further surveys will only be undertaken if the trees are located in areas considered to be of high or medium value for bats (based on the habitat suitability assessment and valuation methodology described above).

2.6.25 Trees with high roost potential will be climbed three times to check for the presence of bats. Trees with moderate roost potential will be climbed twice. These surveys will be undertaken before the application for development consent is submitted.

2.6.26 Trees with roost potential that are located in areas of low value for bats will not be surveyed before the application for development consent if there is uncertainty relating to whether they require felling. If necessary, these trees would be surveyed following the grant of development consent (should that happen) but prior to their felling.

2.6.27 Trees with 'low' potential to support roosts will not be subject to any further surveys although a precautionary methodology will be applied to their felling (e.g. 'soft-felling'), as per the recommendations of Collins (2016).

2.6.28 Climbing inspection surveys of trees are considered to be superior to traditional emergence/re-entry surveys as they allow surveyors to inspect the feature in much closer detail. The surveys are not limited by foliage or poor light conditions. As such, these surveys will be used to confirm the presence or likely absence of bats.

Emergence/re-entry surveys

2.6.29 Dusk emergence/dawn re-entry surveys would only be undertaken if a tree cannot be climbed for safety reasons, or if a confirmed roost needs classifying. The aim of these surveys will be to identify if bats are present. If bats are present, the species, type and usage of roost will also be determined.

2.6.30 Where land access permits, these surveys will be undertaken in accordance with good practice guidelines described by Collins (2016). They will involve visiting trees at dusk and/or dawn to watch, listen and record bats exiting or entering roosts. Surveyors will be appropriately experienced and will be equipped with heterodyne and/or frequency division bat detectors, recording devices, infra-red cameras and heat cameras, as necessary. All surveys will be undertaken between May and late September, depending on suitable weather conditions.

2.6.31 Trees with high roost potential will be surveyed on three occasions. Trees with moderate roost potential will be surveyed on two occasions. The duration of each survey is shown in Table A3.2.6.

2.6.32 Surveys will only be undertaken before the application for development consent if the trees meet the criteria described above (i.e. they support moderate or high PRF and

will likely be directly affected by construction and/or are located in areas of medium or high value for bats).

Table A3.2.6: Presence/likely absence survey timings according to best practice guidelines (Collins, 2016)

Survey type	Start time	End time
Dusk emergence	15 minutes before sunset	1.5 – 2 hours after sunset
Dawn re-entry	1.5 – 2 hours before sunrise	15 minutes after sunrise

2.7 Badger

Desk study

2.7.1 Biological records of badger will be requested within a 1km buffer from the Project from GiGL, SBIC, HBIC and the West Surrey Badger Group.

2.7.2 Using high-resolution aerial photography and other GIS mapping, areas of suitable habitat for sett-building within a 30m buffer of the Order Limits will be identified. 'Suitable habitat' will be determined using the factors which often influence the distribution of badgers, such as: suitable soil and geology, the presence of adequate vegetation cover, plentiful food supply nearby (particularly earthworms) and little human disturbance. Areas of woodland, sloping fields, hedgerows and ditches, treelines along field margins and roadside and railway verges will be highlighted as potential habitats to support badger setts. These areas will be subject to field surveys if they would be directly affected by construction activity.

2.7.3 Areas in which the risk of badger sett presence is considered low, such as residential gardens, arable fields and amenity grassland, will not be subject to targeted surveys.

2.7.4 Areas that would not likely be affected by construction activity will not be subject to field surveys, for example sections of the Project that would be installed using trenchless construction techniques.

Field surveys

2.7.5 Where land access permits, field surveys will be undertaken of all confirmed setts and suitable habitat within 30m of the Order Limits. These will aim to identify the presence of badger setts.

2.7.6 The surveys will also record all other badger field signs such as footprints, latrines, snuffle holes, pathways, or hair.

2.7.7 The best time to undertake these surveys is winter or early spring, before dense vegetation reduces visibility and accessibility. However, it is possible to conduct these surveys at any time of year.

2.7.8 Where found, setts will be mapped and classified according to Natural England guidelines (Natural England, 2010), using the following criteria:

- *Main sett*

  Usually appearing well-used and well-established, often with a large number of holes with big spoil heaps. They are generally considered to be breeding setts

(i.e. where cubs are most likely to be born) and are more often than not in use all year round. Bedding may be present. The presence of well-worn pathways is typical of main setts. A social group of badgers will typically only have one main sett within their territory.

- *Annex sett*

  Annex setts are always close to the main sett and are usually connected by one or more obvious well-worn pathways. Annex setts may not be in constant use, even if the main sett is.

- *Subsidiary sett*

  Subsidiary setts often have very few holes, are usually at least 50m from the main sett and do not have an obvious pathway connecting them to another sett. Subsidiary setts are not continuously active. Classification of these setts can be difficult as they can share characteristics similar to main setts or outlying setts.

- *Outlying sett*

  Outlying setts usually comprise one or two holes with very little spoil outside (thus indicating that the tunnel system underground is not extensive), have no obvious pathway connecting them with another sett and are used only sporadically.

2.7.9 An indication of the level of activity at each sett will also be made as follows:

- *Well-used sett*

  Well-used sett entrances contain no debris or vegetation and are obviously regularly used. Recent field signs will be present, for example bedding, fresh latrines, fresh spoil.

- *Partially-used sett*

  Partially-used setts are those with entrances not in regular use. The entrances may be partially blocked by debris (twigs, leaves etc.) that would require only minimal clearance by a badger to bring them into re-use.

- *Disused sett*

  Disused setts show signs of not having been in use for a considerable period of time and will not be used again without extensive clearance by a badger.

2.7.10 Natural England (2009) guidance will be referred to when assessing whether a sett is in current use.

2.8 Dormouse

2.8.1 It is a Project commitment that field boundaries consisting of hedgerows or trees will be crossed with a reduced construction working width of 10m. All affected habitats suitable for dormice would be reinstated on completion of construction. The impacts of construction would therefore be temporary, reversible and short-duration. As such, it is considered that in most instances all impacts to dormice can be confidently predicted and appropriate mitigation can be implemented. Additional outline information relating to embedded and good practice mitigation is described in Chapter 4 of the Scoping Report. Further information relating to anticipated impacts is provided in Chapter 7 of the Scoping Report.

Desk study

Data search

2.8.2 Historic records of dormouse will be requested from GiGL, SBIC and HBIC. These data searches will encompass all available information relating to dormice within a 1km buffer of the Project.

2.8.3 Aerial imagery (including high-resolution photographs obtained from a light aircraft survey), and habitat maps (e.g. those provided by HBIC and the MAGIC website) will be used to identify all hedgerows, woodland or scrub habitat likely to be affected by the Project.

2.8.4 The MAGIC website will also be reviewed to identify the locations of any EPSML with respect to dormouse within the study area.

Desk-based habitat suitability assessment

2.8.5 Areas considered as being obviously unsuitable to support dormice will be identified and scoped out of the assessment (e.g. grassland, scattered or isolated trees and scrub). These areas would not be subject to further surveys, as per Natural England guidance (Natural England, 2015b).

2.8.6 Area of potentially suitable habitat (e.g. hedgerows, woodland) will also be assessed to determine the likelihood of dormouse presence taking the following factors into consideration:

- type, size and location of the habitat;
- availability of connective habitat to areas of known, or likely, dormouse presence;
- age, structure and management of the affected habitat e.g. young or tightly clipped hedgerows generally have less potential to support dormice than mature hedges that are less regularly managed; and
- the likelihood, and nature of, anticipated impacts to the habitat as a result of the Project.

2.8.7 Dormice are common in Hampshire and Surrey (PTES, undated) and are considered likely to be present within all suitable habitats (i.e. woodland, scrub and hedgerows) with well-established connectivity to the wider landscape. This would almost certainly be the case in areas with recorded dormouse presence and where woodland (especially ancient woodland or large blocks of woodland (i.e. <50ha)) is prevalent in the local landscape (Harris and Yalden, 2008). A comprehensive account of the distribution and status of dormice in Hampshire was produced in 2003 and revealed that dormice occupancy was nearing 70% of woodland sites within the county (McFadyn *et al*, 2004).

2.8.8 As such, it will be assumed that dormice are currently present in all suitable habitats if the results of the data search confirm the historic presence of dormice at these locations. Surveys at these locations would therefore not be undertaken.

2.8.9 Dormouse presence would also be assumed in more distant habitats with direct, well-established and unbroken connectivity to locations with confirmed historic dormouse records (Harris and Yalden, 2008). Surveys at these locations would therefore not be undertaken.

2.8.10 Habitats considered suitable to support dormice would not be surveyed if they, and any connecting habitat, would be unaffected by construction activity (e.g. habitats would be avoided through the use of directional drilling) or if the anticipated impacts would be very minor (e.g. gaps in hedgerows <5m in width would be created).

2.8.11 All remaining suitable habitats likely to be affected by the Project but with no recent or historic records of dormouse presence would be short-listed and subject to field surveys.

2.8.12 The above approach aligns with Natural England's European Protected Species Licencing Policy number 4: *Appropriate and relevant surveys where the impacts of development can be confidently predicted.*

Field surveys

2.8.13 Where land access permits, the aims of the field surveys will be:

- to ground-truth the short-listed sites to ensure that further surveys at these locations are appropriate based on the condition of the habitats present; and
- to confirm the presence or likely absence of dormice.

Field-based habitat suitability assessment

2.8.14 The first stage of the survey will require ecologists to visit each site and assess the habitat to determine its suitability for dormice using the criteria provided in Bright *et al* (2006) and professional judgement:

Increased probability

- Ancient woodland/hedgerows more than 2ha in area (with the probability of dormouse presence increasing with area) (Bright et al, 2006).
- Woodland or hedges with good species diversity for food provision and a wide range of other broadleaved species that provide flowers, fruit or soft mast throughout the summer months (e.g. hazel *Corylus avellana*, honeysuckle *Lonicera periclymenum*, bramble *Rubus fruticosus* agg. oak *Quercus sp.*,

blackthorn *Prunus spinosa*).

- The presence of important features for nesting, such as species-rich edge strips or ride sides in woodland (Bright et al, 2006) or blackthorn in hedgerows (Wolton, 2009).
- Good structural diversity and density, including woodland with a wide age range of trees and a species rich scrub layer (with hazel, honeysuckle or bramble present). As a rule of thumb, visibility in high summer should be less then 20m in optimal woodland sites (Bright et al, 2006).
- Good connectivity to adjacent hedgerows and areas of woodland, especially if adjacent habitat is ancient woodland and/or of a size and structure likely to support dormice (Harris and Yalden, 2008).
- Hedgerows approximately 3m wide and 4m to 5m in height with no active yearly management (hedgerow management has a strong negative effect on dormouse density) (Bright & MacPherson, 2002).

Decreased probability

- Small wood, especially if mostly conifer.
- Isolated or with limited connectivity to adjacent hedgerows and areas of woodland, especially those that are high quality for dormice.
- Little or no shrub understorey or fruiting broadleaved trees.

2.8.15 The habitats will be described, recorded and photographed. Those considered to be unsuitable for dormice will be scoped out and no further surveys will be undertaken. All rationale for the scoping out of sites will be recorded.

Presence/likely absence surveys

2.8.16 Those sites identified as suitable will undergo dormouse nest tube surveys in accordance with good practice guidelines set out by Bright *et al* (2006). These surveys will be undertaken before the application for Development Consent.

2.8.17 The location of the tubes will be mapped using GIS, thus allowing ecologists to accurately locate each tube during future surveys and to record tube-specific results.

2.8.18 A minimum of 50 tubes would be deployed at each ‘site’. A site would comprise a group of connected hedges and/or larger blocks of woodland. Each tube would be spaced at 15m (minimum) intervals.

2.8.19 Dormouse tubes would be deployed in June 2018 and checked once every month until November 2018. Using the index of probability set out by Bright *et al* (2006), this survey effort would achieve a maximum score of 20 points. Bright *et al* (2006) advise that assumed absence should not be based on a search effort score of less than 20.

2.8.20 Where land access permits, the survey effort would be bolstered by increasing the number of tubes at each site (but not reducing the spacing between them). This would increase the probability of recording dormice and would provide greater confidence in a negative survey result.

2.8.21 During each survey visit, every tube would be carefully viewed on its approach to identify any signs of nesting visible from the outside, using a long-handled inspection mirror. Tubes will then be carefully opened within a large, clear plastic bag, and any

contents inspected. All dormice, their nests and any other incidental findings will be recorded.

2.8.22 All surveys of dormouse nest tubes will be undertaken by an ecologist with a Natural England Class Survey Licence or an accredited agent.

2.9 Riparian mammals

Desk study

2.9.1 Biological records for otter and water vole will be obtained from the EA, GiGL, SBIC and HBIC for a 1km buffer from the Project.

2.9.2 Aerial imagery (including high-resolution photographs obtained from a light aircraft survey of the Project) and habitat maps (e.g. those provided by HBIC and the MAGIC website) will be used to identify habitats with the potential to support populations of riparian mammals.

2.9.3 The proposed construction methodology for watercourse crossings will influence whether specific watercourses require further field survey. Where impacts to watercourses will be avoided, for example through the use of trenchless construction techniques, these watercourses will not require further field survey.

2.9.4 Locations will be identified where the Project will cross watercourses using open-cut techniques and/or where a haul route crossing is required. These will all be subject to riparian mammal surveys (either habitat assessments or full surveys).

Field surveys

2.9.5 Where land access permits, the aim of the field surveys will be:

- to conduct an assessment of habitat suitability at all watercourse crossings to confirm whether further surveys at these locations are required; and
- to confirm the presence or likely absence of riparian mammals through field sign surveys, where necessary.

2.9.6 It is embedded mitigation that watercourse crossings would be restricted to 10m in width (see Chapter 4 of the Scoping Report). As such, field surveys will be restricted to an area 200m up/downstream of each possible crossing point. This would accord with recommendations provided in the *Water Vole Mitigation Handbook* for 'works *temporarily* affecting up to 50m of watercourse' (Dean *et al*., 2016).

2.9.7 If the precise location of the watercourse crossing point is not known then the survey area would comprise the entire width of the Order Limits, plus a 200m buffer to either side.

Habitat Suitability Assessment

2.9.8 If land access permits, surveys will be undertaken of all identified watercourse crossing points to assess the habitat for its suitability to support riparian mammals.

2.9.9 These surveys will be conducted between June and October 2018. Factors that will be considered during habitat suitability assessments for riparian mammals are:

- potential for habitat changes throughout the year;
- bank profile;

- bank substrate;
- water depth;
- height of water level and fluctuations relative to bank height;
- shading;
- bankside vegetation; and
- channel vegetation.

2.9.10 Watercourses considered suitable for riparian mammals will be subject to field sign surveys.

Field sign surveys

2.9.11 If land access permits, ecologists will search for field signs of otter and water vole, as described in the *Water Vole Conservation Handbook* (Strachen *et al*., 2011) and *Monitoring the Otter* (Chanin, 2003).

2.9.12 Every watercourse will be surveyed for field signs at least once between June and October 2018.

2.9.13 A second survey would not be undertaken if the results of the first survey confirmed the presence of water vole and if no further information was required to inform an impact assessment or mitigation strategy. A second visit would also not be conducted if the habitat is of very low suitability to support water vole and there is a low likelihood that water voles are in the surrounding area (Dean *et al*, 2016).

2.9.14 All other suitable watercourses would be surveyed for a second time before October 2018.

2.9.15 Field sign surveys will be timed to avoid periods of high rainfall, high water levels or immediately following habitat management activities, as these can wash away or destroy field signs.

2.9.16 Where it is safe to do so, the surveys will encompass all riparian habitats within the survey area, as well as suitable habitat further away from the water's edge that could be used as above-ground sites for water vole nesting, or as otter holts.

2.9.17 Field signs of water voles include burrows, latrines, feeding stations, lawns, nests and footprints. Field signs of otter include holts, spraints, footprints, feeding remains, slides and couches. Any field signs or incidental sightings of riparian mammals identified during surveys will be recorded and mapped. Evidence of mink and small mammals will also be recorded.

2.9.18 No invasive survey methods such as endoscopes will be used.

2.9.19 All surveys would be undertaken by suitably experienced ecologists.

2.10 Summary programme

2.10.1 A summary of the proposed survey programme is presented in Table A3.2.7 below.

Table A3.2.7: Indicative Ecological Survey Programme

Survey	Proposed survey period (where land access permits)
Desk study	Ongoing
Botanical	May 2018 – August 2018 with hedgerow surveys until October 2018, as required
Watercourses	June 2018 – September 2018
GCN	April 2018 – end June 2018 (with additional surveys between April and May 2019, as required).
Dormice	June 2018 – November 2018
Bats	January 2018 onwards for roost assessment surveys June – September for climbing inspections and evening emergence/dawn re-entry surveys.
Riparian mammals	June 2018 – October 2018
Badgers	January 2018 – November 2018
Reptiles	June 2018 – October 2018

3. Landscape and Visual surveys

3.1 Introduction

3.1.1 The Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3), (Landscape Institute and Institute of Environmental Management and Assessment, 2013) promote landscape and visual impact assessment that is proportional to the scale and nature of the proposals and the likely landscape and visual effects.

3.1.2 The Project runs through the sensitive and nationally recognised landscape of the South Downs National Park (SDNP), and close to a large number of other sensitive landscape and visual receptors.

3.1.3 Landscape and visual effects and subsequent mitigation proposals are likely to be the same or very similar across reasonably broad areas of landscape and for groups of visual receptors with the same sensitivity (such as users of public rights of way and residents in properties within similar geographical locations).

3.1.4 The following approach focusses on identifying the key and most significant landscape and visual effects and appropriate landscape mitigation, and adopts a proportional approach for this project.

3.2 Desk study

3.2.1 Landscape and visual effects will be assessed within a maximum 1km offset of the Order Limits. Whilst there may be longer distance views towards temporary construction activity and areas of vegetation loss from visual receptors in excess of 1km, it is unlikely that visual effects would be of significance. This is because of the largely temporary nature of construction effects and/or because of the distance. There may, however, be some exceptions to this from high points within the South Downs National Park. A selection of representative longer distance viewpoints between 1km and 5km from the Order Limits would therefore be included within the assessment, as agreed with SDNP Authority.

3.2.2 A working digital zone of theoretical visibility (ZTV) will be generated up to 5km from the Order Limits. This has been agreed with the SDNP Authority. The ZTV will take into account topography and other existing screening elements such as woodland blocks and built development. To present the worst case scenario, the ZTV will identify the extent of visibility from the surrounding landscape during the construction phase of the project. The ZTV will be used to discuss the selection of representative viewpoints with SDNP Authority and Local Planning Authorities.

3.2.3 A detailed desk study has been undertaken to understand the baseline landscape and visual conditions along the pipeline route. This has utilised:

- national character area profiles;
- national and open access data on the South Downs National Park, Areas of Outstanding Natural Beauty (AONBs), public rights of way including National Trails and promoted routes, listed buildings, Registered Parks and Gardens, Scheduled Monuments, Ancient Woodland, Common Land;
- information from local authorities on local landscape designations, Conservation Areas, Tree Preservation Orders, Landscape Character Assessments, parks and recreational areas;
- consideration of national and local landscape planning policies;
- high resolution aerial photographs.

3.2.4 Survey effort will be reduced by influencing the pipeline routeing throughout the design process. This will highlight known sensitive landscape and visual receptors and enable sensitive features to be avoided where possible, and through careful consideration of trenchless crossings and construction methods and limits to working areas as embedded mitigation measures.

3.3 Field Survey

Landscape survey

3.3.1 The landscape assessment will consider the landscape effects caused by the scheme during construction and operation on published landscape character areas and landscape designations and constraints, including the South Downs National Park, locally designated landscapes and heritage features such as registered historic parks and garden. In terms of survey strategy, the representative viewpoints identified for the visual survey will be utilised to assess the landscape effects

concurrently.

Visual survey

3.3.2 An initial winter landscape and visual survey was undertaken in February 2018 to selected locations along the corridors (see Chapter 4 of the Scoping Report) where access was allowed. This has been used to help establish the extent of visibility towards the pipeline route prior to vegetation coming into leaf, and therefore represents the worst case scenario. It has also been used to inform the choice of representative visual survey locations.

3.3.3 A range of publicly accessible viewpoints have been identified throughout the study area which are representative of groups of visual receptors with the same sensitivity within a similar geographical location. Representative viewpoints have been selected to illustrate the most significant visual effects because of:

- their high sensitivity;
- their location at recognised and important viewpoints or on scenic routes; and
- their proximity to the proposals and the likely change in existing view.

3.3.4 The visual receptors most susceptible to change, and therefore likely to be most sensitive, are classified within Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3; LI/IEMA, 2013), as:

- *'Residents at home;*
- *People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focused on the landscape and on particular views;*
- *Visitors to heritage assets or other attractions, where views of the surroundings are an important contributor to the experience;*
- *Communities where views contribute to the landscape setting enjoyed by residents in the area'.*

3.3.5 GLVIA3 recommends that the value attached to views should also inform the sensitivity of the visual receptor, and that this should take account of:

- *Recognition of the value attached to particular views, for example in relation to heritage assets, or through planning designations;*
- *Indicators of the value attached to views by visitors, for example through appearance in guidebooks or on tourist maps, provision of facilities for their enjoyment… .and references to them in literature or art.*

3.3.6 The most noticeable changes to existing views are likely to be due to the presence of construction activity including site laydown areas and construction compounds, haul routes and access roads, and the removal of existing vegetation.

3.3.7 Representative viewpoints within the study area therefore comprise those of high sensitivity. The locations have been chosen to reflect the most noticeable changes to existing views (see Table A3.3.1). The number and location of representative viewpoints is subject to change. The locations will be reviewed in the context of the ZTV once it is available, and the developing design. Agreement of representative viewpoints will be sought through engagement with the SDNP Authority and landscape officers at local planning authorities that would be crossed by the pipeline.

3.3.8 The survey strategy will be to assess visual effects both during construction and post construction from the representative viewpoints identified.

Table A3.3.1: Representative Viewpoints

Section	Representative viewpoint	Reason for selection
A	1.B3354 Winchester Street, north of Botley	Representative of views from northern residential edge of Botley.
A	2.Crows Nest Lane, Boorley Green	Representative of close views towards the Order Limits from edge of Boorley Green.
A	3.Madoxford Lane, Boorley Green	Close views towards the Order Limits and construction compound from residential properties including Madoxford Farm.
A	4.PRoW south of Hill Farm	Close views towards the Order Limits from users of PRoW and Hill Farm.
A	5.Gregory Lane, Brown Heath	Close views towards the Order Limits and construction compounds from residential properties along Gregory Lane.
A	6.Pilgrim's Trail, Wintershill	Close views towards the Order Limits and construction compound from promoted long distance path within setting of SDNP. Potential significant effects identified within Winter Landscape Survey.
A	7.PRoW north west of Bishops Waltham and Newtown	Close views from PRoW west of settlement edge within SDNP. Potential significant effects identified within Winter Landscape Survey.
A	8.Monarch's Way, south east of Upham	Close views towards the Order Limits from promoted long distance path within SDNP.
A	9.Monarch's Way, Lower Preshaw Lane	Close views towards the Order Limits from promoted long distance path within SDNP and Lower Preshaw Farm.
A	10.Wayfarer's Walk, Betty Mundy's Bottom	Close views towards the Order Limits from promoted long distance path within SDNP.
A	11.Wayfarer's Walk, east of Preshaw Wood	Close views towards the Order Limits from promoted long distance path within SDNP.

Section	Representative viewpoint	Reason for selection
A	12.South Downs Way National Trail, Lomer Farm	Representative of views towards the Order Limits and construction compounds west of Rooksgrove Farm from South Downs Way and Lomer Farm. Potential significant effects identified within Winter Landscape Survey.
A	13.Wayfarer's Walk at Wind Farm	Representative of long distance view within SDNP and from South Downs Way National Trail. Viewpoint identified within evidence base to SDNPA emerging Local Plan. Location on the South Downs Way provides good views north.
A	14.South Downs Way National Trail, Beacon Hill	Representative of long distance view within SDNP, from South Downs Way National Trail and from within Beacon Hill National Nature Reserve. Views from Beacon Hill identified within South Downs Integrated Character Assessment as being panoramic.
A	15.Wheeley Down, Monarch's Way	Representative of long distance views within SDNP and from promoted long distance path. Viewpoint identified within evidence base to SDNPA emerging Local Plan and views across Meon Valley noted within South Downs Integrated Character Assessment and in published literature regarding the Monarch's Way.
A	16.PRoW south east of Kilmeston	Close views towards the Order Limits from PRoW within SDNP.
A	17.Hinton Ampner House and Gardens	View from house and gardens. Promoted tourist attraction within SDNP.
A	18.PRoW west of Brockwood Park Farm	Close views towards the Order Limits from PRoW and Brockwood Park (promoted Krishnamurti Centre) within SDNP. Viewpoint highlighted by SDNPA.
A	19.PRoW south of Bramdean	Representative of views towards the Order Limits from PRoW and southern edge of Bramdean, within SDNP.
B	20.Clinkley Road Byway, West of West Tisted	Close views towards the Order Limits from PRoW within SDNP. Potential significant effects identified within Winter Landscape Survey.

Section	Representative viewpoint	Reason for selection
B	21.Smuggler's Lane, Monkwood	Close views towards the Order Limits and potential construction compound location from housing on Smuggler's Lane.
B	22.Petersfield Road, Monkwood	Close views towards the Order Limits and potential construction compound location from housing on Petersfield Road.
B	23.PRoW south of Kitwood Lane	Close views towards the Order Limits from PRoW within setting of SDNP.
B	24.St Swithun's Way, east of Four Marks	Views towards the Order Limits and potential construction compound location from promoted long distance path within SDNP.
B	25.PRoW north of Upper Farringdon	Close views towards the Order Limits from PRoW within SDNP.
B	26.Chawton Registered Park and Garden	View from the eastern edge of the park within SDNP, where there is a gap within the boundary woodland within Adela Copse and Broadlands Row. Potential significant effects identified within Winter Landscape Survey.
B	27.PRoW, Whitehouse Farm	Close view from PRoW and Whitehouse Farm within SDNP towards the Order Limits and construction compound.
C	28.Hanger's Way, Neatham Down	Close view towards the Order Limits from promoted long distance path. Potential significant effects identified within Winter Landscape Survey.
C	29.Public highway, Upper Froyle	Representative of views towards the Order Limits and potential construction compound locations from southern edge of Upper Froyle. Potential significant effects identified within Winter Landscape Survey.
C	30.St Swithun's Way, Upper Froyle	Representative of views towards the Order Limits from southern edge of Upper Froyle. Potential significant effects identified within Winter Landscape Survey.
C	31.St Swithun's Way, south of Lower Froyle	Close views towards the Order Limits and potential construction compound location from promoted long distance path and southern edge of Lower Froyle.
C	32.PRoW at Bury Court	Views towards the Order Limits from PRoW north of Bentley in vicinity of Bury Court.
C	33.PRoW at Barley Pound	Representative of views towards the Order Limits from PRoW north of Barley Pound.

Section	Representative viewpoint	Reason for selection
C	34.PRoW south of Crondall	Representative of views towards the Order Limits from PRoW south of Crondall and recreation ground. Potential significant effects identified within Winter Landscape Survey.
D	35.PRoW at Dares Farm	Close views towards the Order Limits, potential construction compound location and off-site access from PRoW.
D	36.PRoW north west of Ewshot	Close views towards the Order Limits and potential construction compound location from PRoW.
D	37.PRoW south of Quetta Park	Representative of views towards the Order Limits from PRoW and residential edge of Quetta Park.
D	38.PRoW at Pyestock Hill, Eversley Forest	Close views towards the Order Limits and potential construction compound location from promoted PRoW within Forest of Eversley.
E	39.PRoW across Southwood Golf Course.	Close views towards the Order Limits from PRoW across Southwood Golf Course.
E	40.Playing fields east of Southwood	Close views towards the Order Limits and potential construction compound location from playing fields. Potential significant effects identified within Winter Landscape Survey.
E	41.Queen Elizabeth Park at Farnborough	Close views towards the Order Limits and potential construction compound location from public park.
E	42.Church Path public footpath	View towards the Order Limits and potential construction compound location from public footpath across grounds of Farnborough Hill Convent (grade I listed). Potential significant effects identified within Winter Landscape Survey.
E	43.Blackwater Valley Path	Close views towards the Order Limits from promoted long distance path
E	44. PRoW south of Frimley	Representative of close views towards the Order Limits from PRoW and the southern edge of Frimley.
E		

Section	Representative viewpoint	Reason for selection
E	45.PRoW, Pine Ridge Golf Club	Close views towards the Order Limits from PRoW adjacent to Pine Ridge Golf Club.
F	46. PRoW east of Heatherside	Representative of close views towards the Order Limits from PRoW and the eastern edge of Heatherside.
F	47.The lookout, High Curley, within Bagshot Heath	A promoted viewpoint, set within Lightwater Country Park. Impressive wide ranging views over the surrounding landscape noted within Surrey Landscape Character Assessment (Bagshot and Lightwater West Sandy Woodland).
F	48.PRoW within Westend Common	Representative of view towards the Order Limits from PRoW within Westend Common and open access land at Turf Hill, north of Brentmoor Heath.
F	49.Playing fields south of Windlemere Golf Club, east of Lightwater	Representative of views towards the Order Limits and potential construction compound location from PRoW, playing fields and Windlemere Golf Club.
F	50.PRoW at Little Heath	Representative of views towards Order Limits from PRoW within registered Common Land/Open Access land at Little Heath.
F	51.PRoW at Staple Hill, Chobham Common	Representative of views from within Chobham Common (registered common land and open access land) and National Nature Reserve. Long open expansive views across the heath are described from Staple Hill within Surrey Landscape Character Assessment (Chobham Sandy Heath and Common). Potential significant effects identified within Winter Landscape Survey.
F	52.PRoW at Stanners Hill	Close views towards Order Limits from PROW within Stanners Hill registered Common Land/Open Access land
F	53.PRoW at Chobham Common	Representative of views towards the Order Limits and construction compound from within Chobham Common (registered common land and open access land) and National Nature Reserve.Potential significant effects identified within Winter Landscape Survey.

Section	Representative viewpoint	Reason for selection
G	54.PRoW next to cemetery at Addlestone Moor, south of Chertsey	Representative of views towards the Order Limits from PRoW, cemetery and Abbey Moor Golf Course.
G	55.Woburn Farm Registered Park and Garden	Views towards Order Limits from PRoW within Woburn Hill and Chertsey Meads area of landscape importance along western boundary of Woburn Farm Registered Park and Garden.
G	56.PRoW at Chertsey Meads	Representative of views towards Order Limits from Woburn Hill and Chertsey Meads area of landscape importance, PRoW and from Chertsey Meads public children's play and picnic areas.
G	57.Thames Path National Trail at Chertsey	Representative of views towards Order Limits from promoted national trail and Chertsey Bridge (scheduled monument and grade II* listed).
G	58.Thames Path National Trail	Views from promoted national trail next to Woburn Hill and Chertsey Meads area of landscape importance. The views are described with Surrey Landscape Character Area (Thames River Floodplain) as being relatively open, and long distance, particularly across large water bodies towards surrounding settlement.
H	59.Publicly accessible field, Staines-Upon-Thames	Representative of views from housing on Bingham Drive and Berryscroft Road, overlooking publicly accessible field, and from within the field. Potential significant effects identified within Winter Landscape Survey.
H	60.Woodthorpe Road, Ashford	Representative of views from Woodthorpe Road, Ashford Road and nearby sports complex towards Order Limits and construction compound.
H	61.Fordbridge Park, Staines-Upon-Thames	Close views towards Order Limits from Fordbridge Park.
H	62.Ashford Cemetery, Ashford	Close views towards Order Limits from Ashford Cemetery.

Table A3.3.2: Summary of Proposed Survey Methodology for Landscape and Visual Effects

Survey	Proposed approach and benefits	Best practice and details of any deviations	Justification, precedents and solutions
Desk study	A data search of the following information: • National and local landscape planning policies including extent of Green Belt and open space allocations; • National Character Area profiles and published county and district scale landscape character assessments; • South Downs National Park Integrated Landscape Character Assessment; • Historic Landscape Characterisation Report, South Downs National Park (Wyvern Heritage and Landscape, 2017); Local Plan South Downs National Park: Characterisation and Analysis (Land Use Consultants, 2015); • South Downs National Park Authority Tranquillity Study, 2017; and • South Downs National Park Authority Settlement Context Study Report and User Guide, 2017. • Landscape constraints including: • South Downs National Park; • Locally designated landscapes; • AONBs; • Public rights of way including National Trails and promoted routes • Heritage features including Registered Parks and Gardens, Conservation Areas, listed buildings,	Consistent with best practice and in accordance with Guidelines for Landscape and Visual Impact Assessment, Third Edition, (LI/IEMA, 2013).	Baseline data relevant to SDNP discussed with SDNP Authority. The study area is appropriate to gather baseline information and to gain a broad understanding of the landscape context surrounding the Project. It is intended to make use of a ZTV to help identify representative viewpoints and the field survey effort.

Survey	Proposed approach and benefits	Best practice and details of any deviations	Justification, precedents and solutions
	Scheduled Monuments; • Common Land and Open Access land; • Country Parks and other parks and recreational areas; and • Ancient Woodland and trees subject to Tree Preservation Orders. A 1km wide study area taken from the edge of the Order Limits is considered to be sufficient for gathering baseline desktop data.		
Winter landscape survey	A Winter Landscape Survey (undertaken in February 2018) to familiarise with the landscape character of the study area, to gain an understanding of the general extent of visibility towards the Project from the surrounding landscape, and to identify potential significant views of the proposals when visibility is most open prior to vegetation coming into leaf.	Consistent with best practice.	Winter landscape survey locations were informed by the landscape and visual baseline data gathered, providing a range of assessment points along the study area.
Landscape Character and Visual Impact Surveys	The landscape character surveys will consider the landscape effects caused by the scheme during construction and operation on published landscape character areas and landscape designations and constraints, including the South Downs National Park, locally designated landscapes and heritage features such as registered historic parks and gardens. The representative viewpoints identified for the visual survey will be utilised to assess the landscape effects concurrently. A range of publicly accessible representative viewpoints	Consistent with best practice and in accordance with GLVIA3.	It is intended to make use of a ZTV to help identify representative viewpoints and to refine the field survey effort. Surveys informed by ongoing stakeholder engagement to gain support from key stakeholders including SDNP Authority. Surveys will inform ongoing work to influence the pipeline

Survey	Proposed approach and benefits	Best practice and details of any deviations	Justification, precedents and solutions

	have been identified throughout the study area, for groups of visual receptors with the same sensitivity within a similar geographical location. Representative viewpoints will be selected to illustrate the most significant visual effects because of:
	• Their high sensitivity; and
	• Their proximity to the proposals and the likely change in existing view.
	The locations would be chosen to reflect the most noticeable changes to existing views:
	• Views from residential areas;
	• Views from highly sensitive landscapes, some of which attract high numbers of visitors and tourists, including:
	  • The South Downs National Park;
	  • Locally designated landscapes;
	  • Registered historic parks and gardens;
	  • National Trust properties;
	  • Conservation Areas;
	  • Views from public rights of way including national trails and other promoted routes; and
	Views from public open space, such as public parks, registered common land and open access land.
			route through identification of features to be avoided where possible, and careful consideration of construction methods and limits to working areas as embedded mitigation measures.
			Proposed restoration and planting.

3.3.9 Additionally, there may need to be unforeseen surveys which might arise throughout the design process, e.g. to provide feedback on any design options, to inform the EIA with additional required detail, or to investigate any key concerns raised through stakeholder engagement.

Stakeholder Engagement

3.3.10 The scope of the landscape and visual impact assessment, including the location of proposed representative viewpoints, will be discussed and agreed where possible with local planning authorities and the SDNP Authority prior to the site surveys being undertaken.

4. Arboricultural Survey Strategy

4.1 Introduction

4.1.1 The purpose of this Arboricultural Survey Strategy is to set out the approach and rationale for identifying and recording arboricultural features that may be affected by the Project.

4.2 Approach

4.2.1 The arboricultural surveys aim to capture tree data on woodlands, veteran/ancient trees and notable/mature trees that are likely to be lost or affected by the Project. The approach ensures an efficient and pragmatic approach to tree data collection, to provide category and definition criteria together with information to provide adequate tree protection during the construction phases. Tree protection will be broadly in line with guidance given in British Standard 5837 2012: Trees in relation to design, demolition and construction.

4.2.2 Table A3.4.1 sets out the survey elements and proposed approach for each, and demonstrates the targeted methodology proposed to allow for a proportionate and appropriate survey approach.

4.2.3 There is ongoing engagement with relevant stakeholders along the route, including discussion on surveys and assessment methods. The South Downs National Park Authority (SDNPA) provided feedback which referred to BS5837 and other relevant industry best practice for trees and utilities. This strategy deviates, in some elements, from the guidance given in BS5837 and adopts a targeted approach on what trees will be included in field survey work.

4.2.4 Existing public domain data such as the Woodland Trust's Ancient Tree Inventory will be referenced to identify known ancient and veteran trees that may be located in or close to the Order Limits. Within hard surfaced areas e.g. asphalt roads and pavements the study area will be applied to the trench excavation edges.

4.2.5 Data already captured for the project on trees noted as having potential bat habitat will also be utilised, as will findings from hedgerow surveys being undertaken for ecology purposes.

4.2.6 Desk study information will be used to identify where field surveys are required. In order to put in place measures to protect trees, this strategy will adopt the British Standard calculation for root protection zones. A desk study will assist in locating potentially notable trees prior to any site assessments as detailed in Table A3.4.1.

4.2.7 In addition to providing information detailing root protection areas, ad-hoc site visits may be required to confirm above ground constraints i.e. low branch formation and enabling pruning works to BS 3998 2010: Tree Work-Recommendations.

4.2.8 The arboricultural survey method will also draw upon the following parallel programs of work:

- engagement with environmental regulators, public bodies and other stakeholders;
- ongoing design development, identification of potential mitigation measures; and
- construction planning, and the draft Code of Construction Practice.

4.3 Survey Methodology

4.3.1 The surveying methodology will make the most of detailed desk study data, high-resolution digital aerial photography, GIS, known ancient and veteran trees data and identified ecological tree features together with other project information available. This will target resources to key areas that may need further study, including field surveys. This approach is detailed in Table A3.4.1.

Site data collection

4.3.2 This section lays out a pragmatic approach to collecting tree information whilst seeking to reduce the number of features surveyed by grouping trees where appropriate. An example of the standard data collected for each feature is shown as Table A3.4.2.

4.3.3 The collection of tree data will be targeted to include notable arboricultural features which will be verified across the scheme to include trees over certain stem diameters only.

4.3.4 Each individual tree, group of trees, or woodland block will be given a unique reference number based on its location within the Project. This will exclude hedgerows. ‘T’, ‘G’, or ‘W’ will be used to reference trees, groups of trees and woodland respectively.

4.3.5 Data recorded for tree groups and woodland blocks will provide a generic root protection offset based on professional judgment, with significantly larger trees recorded as individuals.

4.3.6 The tree surveyors will use their judgment and experience based on observed features and proposed distances to construction areas, and the nature of the construction activities, to determine the extent of the trees to be surveyed, noting that the maximum protection radius applied within BS5837 is 15m. Fixed point information and handheld GPS devices will be used to assist surveyors.

4.3.7 As far as reasonably practical vegetation will be surveyed in groups with the largest tree measurements recorded. Information relating to the total number of trees likely to be affected within a group or woodland will be estimated. Arboricultural surveyors will use distometers, clinometers and diameter measuring tapes for recording tree measurements. Common names will be used for tree species.

4.3.8 The height of tree features will be measured to the nearest metre. Stem diameter will be recorded in millimetres. The cardinal points will be used to determine crown spread and recorded to the nearest metre. Life stage will be recorded using young, early mature, mature, over-mature and veteran/ancient. Overall condition will be based on ground based visual tree assessment techniques and will consider structural and physiological factors.

4.3.9 General observations and comment will detail where applicable particular tree features and significant defects such as habitat holes, storm damage fractures and prolific ivy.

4.3.10 Category grading will follow that of BS5837: 2012.

Table A3.4.1. Arboricultural survey elements and proposed survey methodology

Feature and justification for scoping in/out	Proposed approach and benefits	Best practice and details of any deviations	Justification, precedents and solutions
Desk study	A data search using the following sources: • available web-based data, including those held by MAGIC map, the SLP Project's GIS, and the Woodland Trust; • Local Authority records on Tree Preservation Orders and Conservation Areas; • Aerial photography; • Stakeholder information e.g. SDNPA records on historical landscape features; • Data from project ecology and other surveys and sources; • Design information.		Desk studies will focus field surveys on notable trees likely to be affected, and where information from other sources is not available.
Tree data collection	The survey area will encompass the Order Limits plus a buffer extending 15m to either side. The rows below set out the criteria for tree features to be included within the survey.	Consistent with best practice and BS5837: 2012	In open ground areas the risk to tree roots from excavation activities are increased e.g. Ground compaction and soil stripping.
Woodlands	Where appropriate, woodlands within the survey zone will be recorded and professional judgement used for off-setting	Consistent with BS5837: 2012	

Feature and justification for scoping in/out	Proposed approach and benefits	Best practice and details of any deviations	Justification, precedents and solutions
	the root protection area across the woodland block.		
Groups	Wherever possible trees will be grouped and, where appropriate, professional judgement used for off-set calculations of root protection area.	Consistent with BS5837: 2012	
Hedgerows	Hedgerows will not form part of this survey.	Deviation from BS5837: 2012	Hedgerows are being assessed as part of the project's ecology surveys.
Individual trees	Only deemed notable trees will be recorded. It is envisaged that all trees with a stem diameter less than 300mm will be discounted and potentially others with a larger stem size.	Deviation from BS5837: 2012	The survey strategy aims to highlight the larger notable trees that may be impacted, for this reason the stem diameter size has been increased from the BS >75mm guidance to >300mm.
Street /Urban trees	Notes will be made on the overall treescape on a street by street basis. All known street trees will be discounted, private/garden trees will be included where stem diameters are greater than 200mm and are assessed as having root protection areas that extend to proposed excavation alignment.	Deviation from BS5837: 2012	Within the urban environment it is likely that the trees will have restricted rooting areas due to hard surfacing and installed infrastructure. Impacts to tree roots would be restricted to the excavation width only. It is anticipated that the guidance given within NJUG Volume 4 'guidelines for the planning,

Feature and justification for scoping in/out	Proposed approach and benefits	Best practice and details of any deviations	Justification, precedents and solutions
			installation and maintenance of utility apparatus in proximity to trees' will be followed.

Reports

4.3.11 The format for reporting the arboricultural findings, within the ES and application for development consent, could comprise an ‘Arboricultural Impact Assessment’ (AIA).

4.3.12 Using the site data collected an AIA report would highlight those features impacted by the Project. Details of the impacts would be provided in tabulated format indicating the total number of features for removal, partial removal, encroached upon or not impacted.

4.3.13 All of the data collected during the tree survey would be tabulated in the AIA as set out in Table A3.4.2. This table would also provide the predicted impact of the Project upon each individual feature.

4.3.14 The AIA report would be accompanied by a set of plans: “Existing Tree Constraints Plan”

Table A3.4.2 On-site tree data capture fields

Adapting the guidance in BS5837: 2012:2012 the following data fields will be collected:

Tree Ref. No.	Species	Height (m)	DBH (mm)	Crown spread				Life stage	Overall condition.	General observations and comments	Category grading
				N	E	S	W				

5. Cultural Heritage

5.1 Introduction

5.1.1 Cultural heritage comprises the three following sub-topics:

- Archaeological Remains – the material remains of human activity from the earliest periods of human evolution to the present. These may be buried traces of human activities, sites visible above ground, or moveable artefacts;
- Historic Buildings – 'architectural or designed or other structures with a significant historical value'. These may include structures that have no aesthetic appeal or structures not usually thought of as 'buildings', such as milestones or bridges; and
- Historic Landscape – the current landscape, whose character is the result of the action and interaction of natural and/or human factors. The evidence of past human activities is a significant part of the Historic Landscape and may derive both from archaeological remains and historic buildings within it.

5.1.2 Collectively, the individual sites, buildings, landscapes or other remains that make up the three sub-topics are known as cultural heritage assets.

5.1.3 The wider surroundings of any cultural heritage asset (its setting) can significantly contribute to its heritage value. The nature and extent of the asset's setting is not fixed and can change over time as the asset and its setting evolve.

5.1.4 Each cultural heritage survey is part of an iterative process of desk-based study, walk-over survey, and specialist field survey, such as archaeological geophysical surveys. The approach to the cultural heritage surveys is informed by the following principles:

- The surveys will all be carried out to best practice and guidance produced by Historic England and the Chartered Institute for Archaeology (CIfA), and any local guidance where available;
- The surveys will make the most of detailed desk based study reducing the need for field survey and any associated risks;
- The surveys will make the most of data captured by other disciplines such as LiDAR and high resolution aerial imagery;
- The survey will make the most of existing, available datasets, including the results of earlier surveys such as the SDNPA's LiDAR surveys.

5.1.5 Potential effects on cultural heritage are divided into two categories:

- Physical – loss or damage to cultural heritage assets occurring during the construction and operation of the Project. This includes any initial site clearance, excavation, the construction of compounds and off-site areas. Loss or damage to cultural heritage assets can also be caused by traffic movements, including machinery, compacting buried archaeological deposits during construction.
- Effects on the setting – changes that affect the setting of cultural heritage assets during the construction of the Project through the potential for visual and noise intrusion on the setting.

5.1.6 The survey methodology will make the most of detailed desk study data, high-

resolution digital aerial photography, and GIS. Survey effort will be minimised by:

- influencing design and route options at all stages to avoid potential effects on known cultural heritage assets where possible;
- the implementation of embedded and precautionary mitigation to avoid or reduce likely effects, e.g. reducing the amount of ground disturbance during the construction of site compounds and haul roads by building up and protecting the existing ground surface, where deemed appropriate, will reduce disturbance and compaction of archaeological remains.

5.1.7 Surveys will allow the production of cultural heritage baseline and gazetteer.

5.1.8 These principles will be used to inform development of specifications and detailed written schemes of investigation for surveys to be agreed with regulators.

5.1.9 The need for survey will be reduced by a detailed desk study and data collation.

5.2 Cultural heritage surveys

5.2.1 A summary of each element of the cultural heritage survey is presented in Table A3.5.1 below.

Table A3.5.1: Summary of cultural heritage surveys

Survey	Proposed approach and benefits	Best practice and details of any deviations	Justification, precedents and solutions
Desk Study	Baseline Development A data search of the following information using cartographic, records, archive material, journals and other information from: • National Heritage Data and Historic Mapping • Historic Environment Record (HER) data and Historic Landscape Characterisation data • Aerial Photography and LiDAR provided by the Project. • SDNPA LiDAR Data Set • Local Records Office (Surrey History Centre, Hampshire Archives Office) • Historic England Archives The study of LiDAR has been identified as a particularly successful method by Surrey County Council's archaeologists. The desk study will comprise searches for the following key sensitive heritage features including: • Listed Buildings (Grade I, II* and II), • Registered Parks and Gardens (Grade I, II*, and II), • Registered Battlefields and • Scheduled Monuments. • Historic landscapes.	Consistent with best practice.	The use of open access data from these sources means that their presence can be identified early in the project before any consultation needs to take place. Early identification of potential "show stoppers" means that they can be avoided in the design process. Some assets are known locally to be of sufficient significance to be designated but have not yet been entered on the register. Such assets are normally captured in local datasets. Desk Based Assessments are accepted as the best practice first stage of any heritage assessment. They are prepared in accordance with standards provided by the CIfA (Jan 2018) and agreed with the regulators.

Survey	Proposed approach and benefits	Best practice and details of any deviations	Justification, precedents and solutions
	Those designated assets where the Project has the potential to affect the setting of a designated asset will also be included in the cultural heritage baseline. Any other known recorded undesignated cultural heritage assets – archaeological remains and features, historic buildings and landscapes – identified from records will also be identified and included in the baseline. This information will inform the heritage baseline. Further assessment will then be required of this baseline and the potential for unknown archaeological remains. A full Desk Based Assessment will be prepared in consultation with the local authority archaeologists and Historic England. The purpose of the Desk Based Assessment is to identify the likely heritage assets, their interests and value and the character of the study area, including appropriate consideration of the settings of heritage assets and the nature, extent and quality of the known or potential archaeological, historic, architectural and artistic interest. The value will be judged in a local, regional, national or international context as appropriate. Following consultation with the archaeologists from Hampshire County Council and Winchester City Council, historic boundaries affected by the Project will be analysed in accordance with good practice, and if		

Survey	Proposed approach and benefits	Best practice and details of any deviations	Justification, precedents and solutions
	available, guided by a methodology being developed by Hampshire County Council. The study area will typically comprise 300m either side of the Order Limits. However, the archaeologists from Hampshire County Council and Winchester City Council have commented that they would like to see the assessment of archaeological potential within the Desk Based Assessment to be informed by a wider understanding of the archaeological character of the area. Therefore, significant sites and landscapes outside of the 300m study area will be considered to provide a wider context.		
Designated heritage assets, historic buildings, standing archaeological remains such as earthworks and historic landscapes	A survey of assets where further investigation is required to determine condition and potential to be affected by the scheme will be undertaken. This survey will include a written and photographic record of the cultural heritage asset.	Consistent with best practice.	In the South Downs National Park and surrounding rural areas there is a potential for cultural heritage assets to be affected by the transportation of sections of pipe. Driving along the route will allow the potential impact to be considered. Some cultural heritage assets will require further investigation through a site visit to assess their value or significance. The condition, or indeed survival, of some cultural heritage assets may be unknown, and can only be

Survey	Proposed approach and benefits	Best practice and details of any deviations	Justification, precedents and solutions
			determined through a site visit. There is the potential for cultural heritage assets to be affected during the construction of the Project, and for their setting to be affected by noise and visual intrusion. An assessment of the potential impact and any potential mitigation can only be made during a site visit. No impact from the operation of the pipeline has been predicted on the setting of any designated asset.
Archaeological sites	Walkover survey (where possible during other survey visits) to determine ground conditions in advance of any archaeological geophysical survey where this information cannot be determined from aerial photography, in discussions with the project team or other specialists e.g. ecology and landscape. A targeted archaeological geophysical survey will be carried out in areas where: (i) the route for the replacement pipeline deviates from the existing pipeline route, and (ii) the underlying geology and ground conditions are appropriate, and (iii) sufficient desk study information is not available. A broad estimate can be made, given the current limited information	Following consultation with Hampshire County Council, Winchester City Council and Surrey County Council the regulators may require an archaeological geophysical survey on parts of the route. There are no standards outlining the extent of any area to be surveyed, the normal understanding is	Information about ground conditions is required to determine whether an area is suitable for archaeological geophysical survey. Geophysical survey is most effective on arable, pasture or parkland. It will not work in areas of significant magnetic interference. This includes areas of existing hardstanding or highway and areas of existing

Survey	Proposed approach and benefits	Best practice and details of any deviations	Justification, precedents and solutions
	available, that there may be a potential requirement for archaeological geophysical survey along approximately 30km of the 90km route, but this estimate will be refined following and in light of the results of the desk based assessment. The extent of this survey, and its precise methodology, will be determined during discussions with the regulators. A key determining discussion point with the regulators will be whether the technique is applicable where there is already a pipeline present. There will be an area of magnetic disturbance on either side of the existing pipeline where archaeological geophysical survey will not reveal anything. However, the width of the area of magnetic disturbance is determined by a range of factors which are not yet known, and it is uncertain whether this is consistent with the width of the existing trench. Consultation with Surrey County Council has suggested that not all areas will be suitable for geophysical survey, and the location of areas proposed for geophysical survey should be discussed with the relevant local authority archaeologists. Following the identification of any geophysical anomalies, and in those areas where geophysical survey was not recommended, archaeological trial trenching may be required. The archaeologists for Hampshire County Council and Winchester City Council have suggested in meetings in April 2018 that	anywhere within the land take for a scheme where the technique is applicable. General guidance on archaeological geophysical survey is provided in “Standards and Guidance for Archaeological Geophysical Survey December 2014 (CIfA)” and “Geophysical Survey in Archaeological Field Evaluation, 2008 (Historic England)”.	services, e.g. the existing aviation fuel pipeline. The survey is non-intrusive but requires the surveyors to walk in transects across the area being surveyed. This has the potential to damage any crops which can be minimised by appropriate timing, but may otherwise lead to a requirement to compensate landowners. Consent is required to carry out archaeological geophysical surveys within the boundary of a scheduled monument. Not all buried archaeological remains can be identified as geophysical anomalies. Further assessment may be required by the regulators to understand the known buried archaeological remains and assess the potential for unknown archaeological remains. This information may be required to design any mitigation strategy and further archaeological work.

Survey	Proposed approach and benefits	Best practice and details of any deviations	Justification, precedents and solutions
	this work could take place after the application for Development Consent as its primary purpose would be to inform future mitigation.		

5.3 Summary of survey programme

5.3.1 A summary of the provisional survey programme is presented in Table A3.5.2 below.

Table A3.5.2: Indicative Cultural Heritage Survey Programme

Survey	Duration	Start Date
Desk Based Assessment		
National Heritage Data and Historic Mapping obtained		Jan 2018
Historic Environment Record (HER) data and Historic Landscape Characterisation data	3 weeks	March 2018
Visit Local Records Offices	3 days	July/August 2018
Visit Historic England Archive at Swindon	2 days	July/August 2018
Prepare Desk Based Assessment Report	3 weeks	July - Sept 2018
Walkover surveys		
Walkover survey of any designated assets identified during the desk based study, the setting of which may be affected by the construction of the pipeline	15 days (concurrent with survey below)	July/August 2018
Walkover survey of any cultural heritage assets identified during the desk based study where further investigation is required to determine condition and potential to be affected by the construction of the pipeline	15 days (concurrent with above)	July/August 2018
Walkover survey to determine ground conditions in advance of any archaeological geophysical survey where this information cannot be determined from aerial photography, in discussions with the project team or other specialists e.g. ecology and landscape	1	August / Sept 2018
Archaeological Geophysical Surveys	4 – 8 weeks	Autumn 2018

6. Surface and ground waters

6.1 Introduction

6.1.1 The survey strategy for surface and ground water has been prepared within the context of relevant legislation and policy.

6.1.2 The Water Framework Directive (WFD) (including the 2006 transposed Regulations) seeks to ensure that water is treated as a natural asset which must be protected, defended and treated as such.

6.1.3 The survey strategy will make the most of detailed desk study data, high-resolution digital aerial photography and specific information available in GIS. Survey effort will be minimised by:

- influencing design and route options at all stages to avoid potential effects on water interests where possible;
- the implementation of embedded and precautionary mitigation to avoid or reduce likely effects.

6.1.4 Given the sensitivity of the water environment receptors, particularly Principal and Secondary aquifers, groundwater source protection zones (SPZs) and groundwater dependent terrestrial ecosystems (GWDTE), and, based on an assumption that it may not be possible to select a route that completely avoids such receptors, it will be important to be able to demonstrate that good practices have been employed throughout the design and development of the scheme and in the mitigation of potential impacts.

6.1.5 Baseline data must be able to provide sufficient information to inform the developing design with respect to good practices, to proportionately assess the potential impacts on the water environment and to address the key requirements of legislation and policy. A proportionate baseline will be gathered consisting of:

- information on groundwater: aquifer identification and characterisation, groundwater quality, WFD status and, where available, groundwater level, associated groundwater-dependent habitats, abstractions (all uses, including private water supplies);
- discharges to ground, groundwater and surface water;
- watercourses (location, size, flow, geomorphological features, quality and WFD quality elements);
- associated local and downstream ecological designations and flood risk (from all sources).

6.1.6 The identification of water dependent habitats will be undertaken following UKTAG guidance in conjunction with the Project Ecologists.

6.1.7 A significant proportion of the desk-based information is available from publicly available sources, though this is typically restricted to data that identifies designated areas or features, such as Flood Zone 2 and Flood Zone 3, Principal and Secondary aquifers, SPZs and WFD status. Actual data sets such as groundwater level monitoring, technical reports and regional scale groundwater model outputs are expected to be available directly from the Environment Agency, with a potential complementary set of data originating from stakeholders such as the water utilities companies or British Geological Survey (BGS).

6.1.8 Where data are not available from the undertaking of desk-based research to inform the approach, information that can be obtained by targeted ground investigation and, where necessary, site walkover surveys focussed on dependent habitats, WFD assessments and geomorphology assessments will be undertaken. Further details on each are presented below.

6.2 Site walkover surveys

6.2.1 Site walkover surveys will be necessary to characterise key environments that could be sensitive to the development and particularly the construction method at a particular location. Walkovers are not proposed as standard for every section of the route and would focus on watercourse crossings (larger than field drainage ditches) and potential groundwater dependent terrestrial ecosystems (GWDTEs), particularly Sites of Special Scientific Interest (SSSIs) and Special Areas of Conservation (SAC).

6.2.2 A walkover of relevant SSSIs and potential GWDTEs will be undertaken with an ecologist to understand the topography and the likely sensitivities of the habitats in the area to any potential impacts of construction activities, particularly with respect to shallow groundwater ponding and flow paths and how these might be affected by land clearance and trenching. This will be used to confirm whether these ecological sites are actual GWDTEs and will feed into the conceptualised hydrological-hydrogeological functioning and the determination of the degree of groundwater dependency. These walkover surveys would identify the need for further intrusive surveys within or adjacent to the GWDTE.

6.2.3 Walkover survey of watercourse crossings will also inform the geomorphology and WFD assessment, including potential geomorphological impacts where trenchless techniques are not proposed (i.e. by a crossing by open-cut techniques). The rationale for this approach is that, whilst trenchless techniques will inherently avoid any direct impact on the bed of watercourses and to the banks, there is a need to understand the physical condition to the watercourse and the risk of scour for those watercourses crossed by open-cut techniques to inform the design in terms of the depth of the trench and the channel reinstatement requirements. For watercourses crossed by trenchless techniques, surveys may be required to determine the depth the pipe should be beneath the watercourses to reduce the potential for future interaction with the channel if it is likely to erode. This is a key aspect of good practice and will be required to address the Environment Agency's policy concerns over the lifetime of the development.

6.2.4 The following is proposed for the watercourse survey extents:

- drainage ditches – no survey;
- small watercourses – walkover within 500m of the Order Limits ; and,
- larger watercourses (i.e. Main River, active rivers or WFD principal watercourses) – walkover 250m upstream and 250m downstream of the route.

6.2.5 This will ensure data is available to assess the impacts of construction even where the alignment of the pipeline is subsequently adjusted slightly. The survey extents could vary where sensitive receptors are identified in close proximity to a watercourse, with additional spot checks undertaken. This would be dependent on construction techniques and assessed on a site-by-site basis. The geomorphological walkover surveys will use mobile mapping to capture data on channel processes (including erosion and deposition), riparian features/habitat, bed and bank characteristics and notable structures and channel adjustment. All walkover surveys will be undertaken with an aquatic ecologist, to provide an understanding of habitat and inform the assessment on the WFD biological quality elements.

6.3 Groundwater surveys

Borehole Investigation

6.3.1 Ground investigation (GI) data are required in some locations to verify information that is being gathered during the desk-based research and which cannot be verified by other means. Much of the GI data will be required to address gaps in the data provided by desk-based research that is required to confirm characterisation of key aspects as captured in the relevant legislation and policy.

6.3.2 The GI would be focused at major route crossings (e.g. railway lines, major roads, major water courses), in addition to areas of known landfills. Groundwater investigation is also proposed in areas of groundwater flooding, or areas where there is an anticipated high groundwater table and in groundwater SPZs and/or where groundwater is expected to sustain designated ecological receptors potentially directly affected by the proposed route.

6.3.3 It is envisaged that at selected crossings (including railway lines and a number of roads, rivers and other major infrastructure) some form of trenchless installation technique may be adopted for the installation of the new pipeline (e.g. pipe augering/ jacking or horizontal directional drilling (HDD)). The design of these trenchless techniques requires information on ground and groundwater conditions at depth beneath the crossings and this information would be required to demonstrate that good practices are implemented to meet required standards.

6.3.4 Shallow boreholes are proposed at many of the crossings in combination with locations selected by the geotechnical team, taken to a nominal depth of about 10m below ground level. However, boreholes may be deeper, depending on the topographical conditions e.g. if the railway or road is in a cutting, or in vicinity of rivers, where there may be a significant depth of soft / loose superficial deposits. Where possible, groundwater monitoring standpipes (nominally 50mm diameter) would be installed in each borehole, subject to agreement with the landowners. The standpipes would comprise a slotted screen standpipe (nominally 50mm diameter) with a gravel pack surround and secure head works to allow monitoring. The depth of the slotted section of standpipe would be determined as the works progress based on the observed geology and hydrogeology, including the depth at which groundwater was encountered.

6.3.5 Where agreed with landowners, groundwater level data loggers would be installed in the standpipes. These loggers would maximise the number of groundwater level readings available and would show short term fluctuations in groundwater level. Loggers would also reduce the number of monitoring visits required. To determine the accuracy of the logger readings, and provide a back-up to the data should a logger fail, periodic manual measurements of groundwater levels would also be made (likely to be approximately monthly). Monitoring would be undertaken for a period of at least 6 months.

6.3.6 A similar approach has been taken for areas of potential groundwater flooding, SPZs and where groundwater is expected to sustain designated ecological receptors. Targeted locations have been identified. Where possible, groundwater monitoring standpipes (nominally 50mm diameter) and groundwater level loggers would be installed in each borehole, subject to agreement with the landowners, for a period of at least 6 months.

6.3.7 Proposed borehole locations are shown in Figure A3.3 (although these are subject to final agreement). Two sets of boreholes have been determined; “priority” boreholes and “non-priority” boreholes. The priority boreholes are determined as being of most benefit to the project. All boreholes for groundwater purposes have been determined as priority boreholes. The locations of the boreholes include those adjacent to major river crossings, within SPZs (to determine if superficial deposits may provide protection to the underlying aquifer) and areas identified as potentially being susceptible to groundwater flooding where shallow groundwater may be present.

6.3.8 The location of the boreholes has been selected using available geological and hydrogeological data, aerial imagery and following initial discussions with landowners. However, the borehole locations should be regarded as approximate and would need to be agreed on site following a more detailed assessment of the site constraints, e.g. access, location of underground / overhead services, landowner constraints, etc.

Shallow Soil Surveys at GWDTE

6.3.9 At GWDTE sites where desk study and/or site walkovers have determined that the site may have high groundwater dependency and there is insufficient existing information on the shallow geology and hydrogeology, soil coring would be undertaken. Based on desk study and initial site walkovers by ecologists, three sites have currently been identified where soil coring is proposed: Ewshot Meadow (North), Folly Bog (part of the Colony Bog and Bagshot Heath SSSI) and Chobham Common SSSI. The soil coring survey would be subject to landowner permission and obtaining consent from Natural England where required.

6.3.10 The soil coring survey would involve hand augering at a nominal diameter of 50mm to identify the shallow soil conditions, including the presence of peat and more permeable horizons. The likely depths obtained by this augering would be in the region of 1m to 2m but is dependent on the ground conditions encountered. The soil conditions observed would be recorded and photographs of the soil cores would be made. The groundwater horizons encountered and the depth to groundwater would be recorded. Following the coring of each hole, the hole would be backfilled with the risings from the hole.

6.3.11 It is anticipated that between 12 and up to 30 soil cores would be taken at each GWDTE site. These would be located so that sections of the shallow soil profile could be drawn up running both parallel to the proposed pipeline and perpendicular to it.

7. Soils and Geology

7.1 Introduction

7.1.1 The initial ground investigation will be focused at major route crossings – see section 6.3.

7.1.2 The initial scope has been based on review of publicly available information and initial consultation with stakeholders who may hold relevant information; in particular, the Environment Agency (groundwater, landfills), Local Authorities (historic landfills), British Geological Survey (boreholes database) and landfill operators. The scope will be revisited and possibly refined on receipt of further information.

7.2 Route Crossings

7.2.1 The design of trenchless techniques for some selected major crossings requires information on ground and groundwater conditions at depth beneath the crossings. In this regard, deep boreholes are proposed at each crossing, taken to a nominal depth of about 10m.bgl, although, they may need to be deeper, dependent on the topographical conditions e.g. if the railway or road is in a cutting, or at major river crossing, where there may be a significant depth of soft / loose superficial deposits.

7.2.2 At this initial stage the investigation boreholes would include the recovery of bulk samples for soil description, together with environmental samples to assess potential contamination. In situ Standard Penetration Tests (SPT) would also be carried out to enable an assessment to be made of the stiffness and strength of the soils / rock at the crossings; required to identify the type of trenchless method best suited to the ground conditions. It is proposed to carry out the boreholes using cable percussive drilling rigs, which are well-suited to drilling within the anticipated ground conditions. Truck-mounted rotary drilling rigs may also be used, where the chalk bedrock is the main strata.

7.3 Landfill sites

7.3.1 The Project crosses several known landfill sites. These have the potential to affect the engineering design and route decision, through the presence of unacceptable levels of contaminants (for example large quantities of asbestos containing materials, chemical drums, or particularly noxious leachate) or particularly unstable ground conditions (for example voids). While a preliminary investigation cannot discount the presence of such hazards, it can give a better indication of ground conditions within the identified landfill area. The investigation in landfill areas also has the objective of investigating the presence of shallow ground water/ perched water within the landfills. This is especially important in areas of Principal and Secondary aquifer where the Environment Agency (EA) may object if groundwater within the landfill is in continuity with groundwater within the aquifer.

7.3.2 The preliminary investigation will also provide information to inform:

- Assessment of risks to workers, the public and the environment from contaminated ground and groundwater which may be disturbed by the construction;
- Assessment of the potential for landfill gas which could be mobilised by the works (including the potential for future migration along the pipeline);

- Initial characterisation of waste soils which could be generated by the works.

7.3.3 To better characterise the landfill material and to identify the potential contamination and settlement risk, it is proposed to carry out a series of 'windowless sampler' boreholes and trial pits within the landfills. The trial pits would generally be to up to about 3m depth, whilst the boreholes would extend to depths of about 5m, with installation of 50mm standpipes. In no case is it intended to drill through the base of the landfill. Appropriate environmental samples would be obtained for laboratory testing. For authorised landfills, permissions would need to be obtained from the landfill operators, prior to the work being carried out. Any work on Landfill Directive Compliant Landfills would require work to be undertaken under full Certified Quality Assurance procedures agreed with the EA.

7.3.4 The scope may be refined following further targeted desk study and stakeholder consultation, to gather information on the likely composition and depth to the base of the landfills, required to inform the assessment of the depth required for trenchless crossings and to manage the risk of drilling through the base of the landfill.

7.3.5 The location of proposed boreholes for the Project is shown in Figure A3.3 (although these are subject to final agreement).

8. Next Steps

8.1 Stakeholder Engagement

8.1.1 Further discussions will be held with the environmental regulators/key stakeholders with the aim of gaining their support for the proposed survey approach and methodologies (see Scoping Report, Chapter 17 Next Steps).

8.1.2 Key regulators and stakeholders include the Planning Inspectorate, Natural England (NE), the Environment Agency (EA), Historic England (HE), South Downs National Park Authority, Hampshire and Surrey County Councils and district councils. Meetings are being held with these and other stakeholders to engage them with the project on a range of issues on an ongoing basis.

8.2 Design Development and EIA

8.2.1 Project design will be progressed, including:

- ongoing desk studies, data collation and surveys;
- ongoing design development, identification of potential mitigation measures; and
- construction planning, drafting of a Code of Construction Practice;
- Statutory Consultation on the preferred route (autumn 2018), including the submission of a Preliminary Environmental Information Report (PEIR);
- Submission of DCO application, with Environmental Statement (2019).

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Appendix 4

Preliminary Report to Inform Habitats Regulations Assessment Report

Scoping Report Volume 1

Esso

JACOBS

Southampton to London Pipeline Project

Esso Petroleum Company, Ltd.

Scoping Report Appendix 4 Preliminary Report to inform Habitats Regulations Assessment Report

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Southampton to London Pipeline Project

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Appendix E. In-combination Assessment

Appendix F. PINS DCO Screening Matrices

Executive Summary

0.1.1 The Esso Petroleum Company, Limited (Esso) is looking to replace 90km of an existing 105km aviation fuel pipeline that runs from the Fawley Refinery near Southampton, to the Esso West London Terminal storage facility in Hounslow.

0.1.2 The Project is classified as a Nationally Significant Infrastructure Project (NSIP) and will require a Development Consent Order (DCO) to give permission to install the pipeline, under the Planning Act 2008.

0.1.3 The route for the replacement pipeline has the potential to affect a number of sites of importance for nature conservation at an international level (European sites).

0.1.4 The *Conservation of Habitats and Species Regulations 2017* requires all plans or projects to be assessed by the Competent Authority to determine if there is likely to be a significant effect on European sites before a DCO can be granted.

0.1.5 This preliminary report is provided for the Planning Inspectorate and Natural England to review and comment at this stage, in relation to Stage 1 (Screening) of the Habitats Regulations Assessment (HRA) process. The aims of a Screening assessment are to identify whether the proposals would result in likely significant effects on the qualifying interest features of European sites, and to inform the requirement for mitigation measures and/or a Stage 2 Appropriate Assessment.

0.1.6 Further assessment, project design, and consultation and engagement with Natural England will be undertaken, and a further report may then be submitted to the Planning Inspectorate at a later stage of the Project, to enable the Inspectorate (in consultation with Natural England) to advise on whether an appropriate assessment is required. The HRA Report (including sufficient information for appropriate assessment if required) to enable the Inspectorate (in consultation with Natural England) to undertake its Habitats Regulations Assessment will be submitted with the DCO application.

0.1.7 The information presented in this preliminary report considers potential effects pathways between the Project and European sites. Seven European sites were identified within the Project's hypothetical zone of influence: Solent Maritime Special Area of Conservation (SAC), Solent and Southampton Water Special Protection Area (SPA), Solent and Southampton Water Ramsar site, Thames Basin Heaths SPA, Thursley, Ash, Pirbright and Chobham SAC, South West London Waterbodies SPA and South West London Waterbodies Ramsar site.

0.1.8 Based on the information presented in this preliminary report, it is considered that no likely significant effects would arise as a result of the Project *alone* to: Solent and Southampton Water SPA/Ramsar, Solent Maritime SAC and the South West London Waterbodies SPA/Ramsar. This is owing principally to the distance between these sites and the Project.

0.1.9 Likely significant effects are not anticipated as a result of the Project *alone* to the Thames Basin Heaths SPA. This is owing to proposed embedded mitigation that would ensure construction works would avoid periods when the qualifying interest features would be breeding. However, based on the *People Over Wind and Sweetman* ruling, the Thames Basin Heaths SPA may require consideration at Stage 2 Appropriate Assessment due to the proposed embedded mitigation. Further advice from Natural England is required to confirm this.

0.1.10 Based on the available information, it is not yet possible to conclude that there would be no likely significant effects to the Thursley, Ash, Pirbright and Chobham SAC. Based on the current proposals, this site should be assessed at Stage 2 Appropriate Assessment.

0.1.11 At this early stage in the Project, a comprehensive assessment of effects in-combination with other plans and projects has not yet been undertaken. This element of the assessment will be completed once the Project's design has been finalised and following agreement from Natural England (in response to this preliminary report) that the proposed methodology is adequate. An updated version of this report will be provided to Natural England for its review prior to a final version being submitted to the Planning Inspectorate as stated above.

1. Introduction

1.1 Project Overview

1.1.1 Esso is looking to replace 90km of an existing 105km aviation fuel pipeline that runs from the Fawley Refinery near Southampton, to the Esso West London Terminal storage facility in Hounslow.

1.1.2 Completed in 1972, the existing pipeline initially carried a type of oil used for large industrial sites and oil-fired power stations. Since the 1980s it has been used to supply aviation fuel to some of the UK's busiest airports. Esso is now looking to update this key piece of infrastructure to maintain the supply of aviation fuel across the south east long into the future.

1.1.3 Esso has already replaced 10km of pipeline between Hamble and Boorley Green in Hampshire. Esso now want to replace the 90km of pipeline between Boorley Green and the West London Terminal storage facility.

1.1.4 The Project is classified as an NSIP and will require a Development Consent Order (DCO) to give permission to install the pipeline, under the Planning Act 2008.

1.1.5 The project also falls within the Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017, which require an Environmental Statement (ES) to be prepared and submitted with the application for development consent.

1.2 Background to Habitats Regulations Assessment

1.2.1 A network of designated sites of community importance has been established by EU member states (the 'Nature 2000 Network'), comprising SACs and SPAs. SACs are designated under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive') for supporting habitats or species listed on Annex I or II of the Directive. SPAs are designated under Council Directive 2009/147/EC on the conservation of wild birds (the 'Birds Directive').

1.2.2 European sites in the UK comprise SACs and SPAs but national policy also requires the term 'European site' to include potential SPAs, possible SACs and listed or proposed Ramsar wetland sites.

1.2.3 *The Conservation of Habitats and Species Regulations* 2017 (hereafter referred to as 'the Habitats Regulations') requires all plans or projects to be assessed by the Competent Authority. This determines whether a plan or project would result in likely significant effects (LSEs) to European sites. This assessment is required to be undertaken before development consent can be granted.

1.2.4 Section 63(1) of the Habitats Regulations requires that:

"A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which

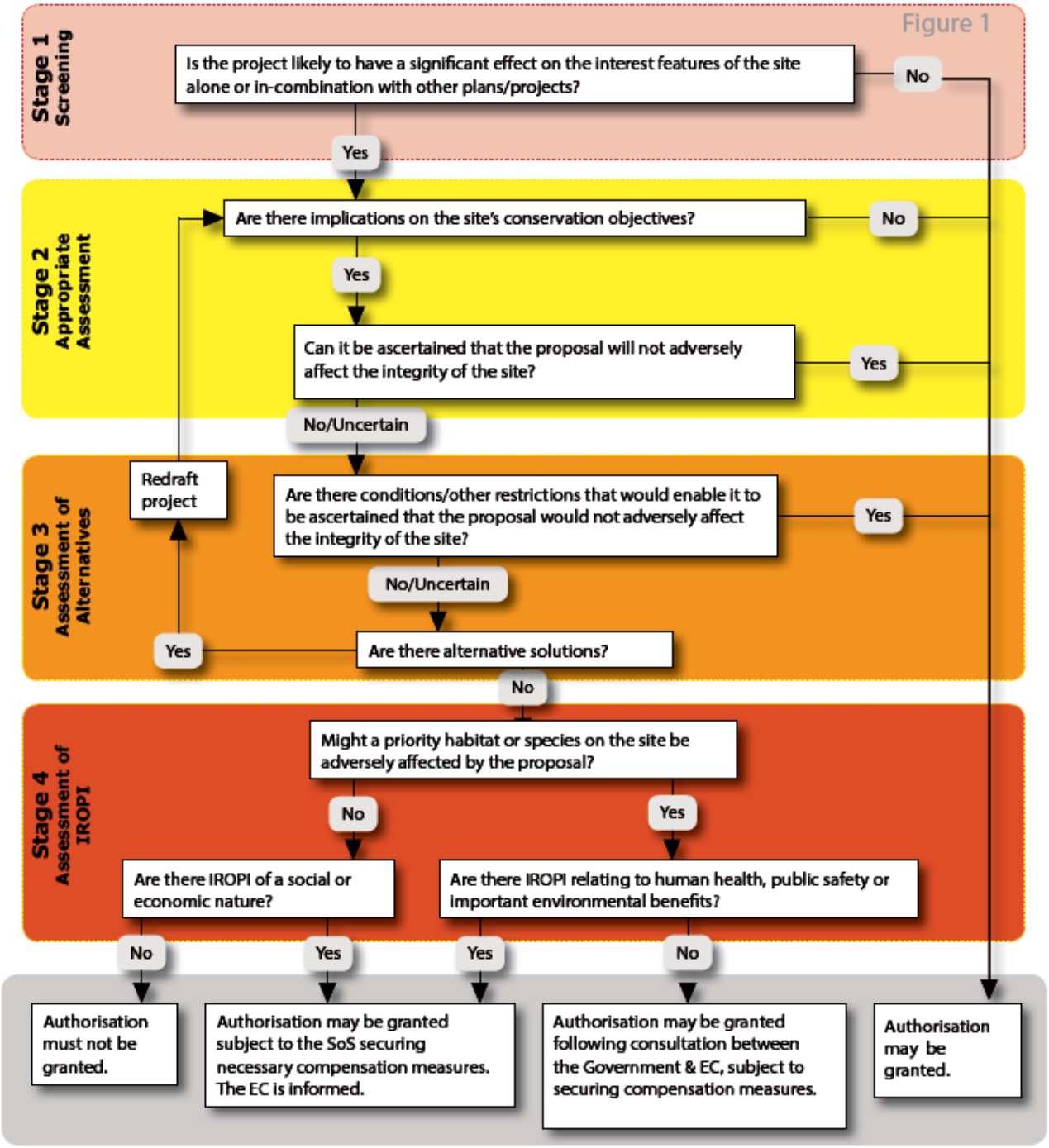
a) is likely to have a significant effect on a European Site or a European offshore marine site (either alone or in-combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of that site,

must make an Appropriate Assessment of the implications for that site in view of that site's Conservation Objectives."

1.2.5 Planning Inspectorate (PINS) *Advice Note 10* (2017) outlines a four-stage process for HRA, of which the first stage is the Screening process. This preliminary report provides information relating to Stage 1 Screening.

Figure 1.1 : The stages of the HRA process (PINS, 2017)



2. Project Description

2.1 Summary of Project and Design Evolution

2.1.1 A description of the Project and design principles can be found in Chapter 3 (Description of the Development) of the Scoping Report. The design evolution is described in Chapter 4 (Design Evolution) of the Scoping Report.

2.1.2 Following sifting of the long list corridor options to create the short list (the term sifting is used to describe the process of comparing long list options to create the short list) and appraisal of shortlisted options to identify the favoured corridors, and also analysis of responses received from the replacement pipeline corridor consultation (non-statutory) carried out in March/April 2018, a preferred corridor for the replacement pipeline was selected and announced to the public on 30 May 2018.

2.1.3 The preferred corridor largely follows the route of the existing pipeline with the exception of locations where constraints required the corridor to be widened or diverted.

2.1.4 The route of the replacement pipeline was developed using the selected preferred corridor and is shown in Figure A4.1.

2.1.5 The replacement pipeline starts at the end point of the previously replaced 250mm (10 inch) pipeline near Boorley Green, with the route generally running northeast, via the existing Pumping Station in Alton and ending at the West London Terminal storage facility.

2.1.6 A new pigging station would be constructed close to the start point of the replacement pipeline near Boorley Green, to allow inspection of the replacement pipeline, using inspection devices known as Pipeline Inspection Gauges (PIGs). The new pigging station would also include a PIG receiver to accommodate PIGs used to inspect the section of the pipeline between Hamble and Boorley Green.

2.1.7 The replacement pipeline would be buried underground for its entire length. The minimum depth from the top of the pipe to the ground surface would be 1.2m in open cut sections. For trenchless crossings of railway lines and a number of roads, rivers and other major infrastructure the depth would be greater to avoid existing services and physical obstructions.

2.1.8 Approximately ten remotely operated Valves would be installed along the route of the replacement pipeline to allow isolation for maintenance or in case of emergency. Each valve would be installed within a sub-surface chamber located within a small fenced enclosure.

2.1.9 The pipeline Order Limits (provisional limits that include both the pipeline route and the temporary working areas that would be required to install the pipeline such as access routes and working compounds, hereinafter referred to as “Order Limits”), are typically 30m wide. This would ensure flexibility for detailed routing and construction methodologies for pipeline installation. Where specific restrictions on working width exist, for example for street works in urban areas, the Order Limits have been narrowed.

2.2 Pipeline Construction

2.2.1 Details relating to pipeline construction are provided in Chapter 3 (Description of the Development) of the Scoping Report.

2.2.2 The pipeline would be constructed through a combination of open cut trenching and trenchless construction techniques. The Order Limits would include the trench and/or drilling sites, haul routes and working areas, areas for storage of excavated material and for lengths of pipe, compound areas, turning areas and safe working distances.

2.2.3 In rural areas, the Order Limits would be typically 30m wide. Where practicable, this would be narrowed for ecologically sensitive areas, such as hedge and watercourse crossings, and designated wildlife sites.

2.2.4 Open cut trenching would involve the cutting of a trench to a depth of approximately 1.5m and width of approximately 0.6m, with the pipeline installed onto the bed of the trench if ground conditions are suitable. The trench would then be backfilled. The excavation works would be designed according to local conditions, with topsoil and subsoil stripped/excavated and stored separately as appropriate and following good practice guidance (e.g. DEFRA, 2009).

2.2.5 Trenchless construction methods would also be adopted at specific locations. More information relating to these is provided in Chapter 3 (Description of the Development) of the Scoping Report.

2.3 Pipeline Operation and Maintenance

2.3.1 Once the pipeline is operational, Esso would carry out a programme of inspection and maintenance in accordance with good practice and regulatory requirements. This would typically include:

- inspections of valves, typically on a monthly basis;
- pipeline route walkover inspections, typically completed in the winter months every two years;
- pipeline route helicopter inspections, typically every other week;
- pipeline route patrols by vehicle/on foot in discrete areas, typically on a weekly basis;
- cathodic protection (CP) transformer rectifier cabinet inspections, typically on a monthly basis;
- testing of CP system (measurement of current at CP test points), typically on a biannual basis; and
- a programme of cleaning and inspection using PIGs.

2.3.2 Where issues are found, these would be corrected by appropriate remedial works.

2.4 Decommissioning

2.4.1 When the pipeline operator determines that it will permanently cease pipeline operations, it will consider and implement an appropriate decommissioning strategy taking account of good industry practice, its obligations to land owners under the relevant pipeline deeds and all relevant statutory requirements.

2.4.2 Decommissioning of the existing pipeline is covered by the original consent and therefore does not form part of this Project.

2.5 Avoidance and Mitigation of Effects

2.5.1 As described in Chapter 4 (Design Evolution) of the Scoping Report, the approach applied to the selection of the preferred corridor and subsequent design development has included collation of baseline information and consideration of environmental constraints.

2.5.2 The process has resulted in identification of potential environmental impacts for which mitigation by design and/or application of embedded and good practice mitigation, is appropriate. The provisional commitments to both embedded and good practice mitigation identified at the current stage of design development are summarised below, where relevant to this study to inform an HRA.

Embedded Mitigation

2.5.3 As a key part of the development of the route, the Project has carefully considered potential environmental impacts for which embedded mitigation is appropriate. The embedded mitigation assumed at this stage includes a number of project-wide design measures. It also includes an extensive list of more specific design measures associated with the development of the route, and the positioning of the pigging station, valves and temporary infrastructure required for construction.

2.5.4 The route generally follows that of the existing pipeline, which passes through three component sites of the Thames Basin Heaths SPA and two of the Thursley, Ash, Pirbright and Chobham SAC.

2.5.5 Table A4.2.1 outlines the proposed embedded mitigation with respect to European sites.

Table A4.2.1 Embedded mitigation with respect to European sites

European site	Embedded mitigation	Purpose
Thames Basin Heaths SPA	All site preparation and construction works within the Thames Basin Heaths SPA would ideally be undertaken between 1st October and 31st January to avoid the breeding period of the qualifying features of this site. Where it becomes necessary to undertake works during the breeding season, such works would be carried out under the supervision of an appropriately experienced Environmental Clerks of Works (ECoW) and in agreement with Natural England.	To avoid disturbing ground nesting SPA birds.

European site	Embedded mitigation	Purpose
Thames Basin Heaths SPA (within Bourley & Long Valley SSSI	Use the existing tracks north of Aldershot Road for construction activity.	To avoid or reduce damage to heathland habitat.
Thames Basin Heaths SPA (within Colony Bog and Bagshot Heath SSSI)	Use the existing tracks and narrow the working area. Position a compound in a grassland area adjacent to Maultway. A short section of the alignment has been moved into Red Road. Ensure a trenchless working area for the A322 crossing is outside of the SSSI/SPA.	To avoid or reduce damage to SPA habitat.
Thames Basin Heaths SPA (within Chobham Common SSSI)	Use the existing track for pipe laying plus narrow working area to the side.	To avoid or reduce damage to heathland habitat.
Thursley, Ash, Pirbright and Chobham SAC (within Colony Bog and Bagshot Heath SSSI)	Alignment moved to follow high ground and to make use of existing tracks. A short section of the alignment has been moved into Red Road.	To avoid or reduce damage to heathland and wetland habitat.
Thursley, Ash, Pirbright and Chobham SAC (within Chobham Common SSSI)	Use the existing track for pipe laying plus narrow working area to the side. Widen the Order Limits to give more design flexibility.	To avoid or reduce damage to heathland and wetland habitat.

2.6 Good Practice Mitigation

2.6.1 The Code of Construction Practice (CoCP) will incorporate the measures that the contractor would be required to implement during construction and operation (as set out in Chapter 4 of the Scoping Report). An outline CoCP is included as Appendix 1 to the Scoping Report. The final CoCP would be secured upon grant of development consent and would form the basis of the contractor's Construction Environmental Management Plan (CEMP). The replacement pipeline will be operated in accordance with good practice and regulatory requirements.

2.6.2 Typical good practice standards to be incorporated into the CoCP are outlined in Chapter 4 (Design Evolution) of the Scoping Report. This includes measures to prevent and control pollution incidents; avoid or reduce air quality changes; avoid or reduce the effects of lighting and noise; and the control of the spread of invasive non-native species. These measures have been taken into account as part of this preliminary study to inform an HRA.

2.7 Biodiversity Enhancements

2.7.1 As the design of the Project develops, opportunities will be sought to deliver biodiversity enhancements so as to achieve a habitat net gain. Further details relating to any enhancements of relevance to European sites will be presented in

future versions of this preliminary report and will support the application for development consent for the Project.

3. Assessment methodology

3.1 Outline Methodology

3.1.1 This study follows guidance provided by the European Commission (EC) (EC, 2001), and set out in paragraphs 4.8 to 4.21 of PINS *Advice Note 10* (PINS, 2017) which provides a framework for the assessment of implications for European sites of NSIPs.

3.1.2 The methodology for the study used in this report adapts that set out in the *Design Manual for Roads and Bridges* (DMRB) (Highways Agency, 2009). The DMRB methodology has been tailored for linear infrastructure projects (i.e. roads) which while of a larger scale than this proposed Project would have broadly comparable potential pathways for effects. The DMRB methodology is therefore considered to provide an appropriate basis for this study to inform the HRA screening assessment.

3.1.3 The assessment of implications to European sites set out in this report includes:

- identification of pathways between the Project and European sites (source-receptor pathways);
- identification of Project activities with potential LSEs via the identified pathways; and
- identification of Project activities which in-combination with other plans or projects could result in LSEs.

3.2 Identifying Source-Receptor Pathways

3.2.1 This assessment uses the 'source-receptor pathway' approach in order to identify European sites to be considered in Screening. This approach is consistent with European Commission guidance (EC, 2001), and with guidance for Screening set out in PINS *Advice Note 10* (PINS, 2017).

3.2.2 Firstly, the source-receptor pathway approach identifies potential sources of effects arising from the Project. Secondly, potential pathways to European sites are identified along which such effects might progress. To determine whether a potential source and pathway were relevant to a European site, the geographical location and nature of the receiving environment were considered. This included an appraisal of the European site's ecology and specific vulnerability to the anticipated level and nature of the effect.

3.2.3 Consideration was given to any European site within 2km of the Order Limits. European sites where bats are a qualifying feature were considered if located within 30km of the Order Limits (Highways Agency, 2009). Where the Order Limits would cross or would lie adjacent to, upstream of or downstream of a watercourse or waterbody designated as a European site, then consideration was also given to this site.

3.2.4 Consideration was also given to the potential for more complex pathways that might link a receptor to an impact source, including indirect linkages. This included consideration of effects to qualifying species of European sites that are mobile, and which could be present outside European sites but within the Project's zone of influence (ZOI). Other indirect pathways considered included impacts to Suitable Alternative Natural Green Space (SANGS), which might lead to impacts to the

Thames Basin Heaths SPA via displacement of recreational activities from SANGS sites to the SPA.

3.3 Identification of Project Activities with Potential for Likely Significant Effects

3.3.1 All Project activities were assessed for their potential to lead to LSEs. The following criteria were considered when reviewing the proposed activities for LSEs:

- the size, scale and area of the works as they relate to land take;
- the extent of physical changes that could arise from proposed activities;
- resource requirements (water abstraction, etc.);
- emissions and waste (disposal to land, water or air); and
- transportation requirements.

3.3.2 Each activity was then assessed for its potential to generate LSEs using the criteria described in Table A4.3.1.

3.3.3 Good practice guidance, scientific literature, and professional judgement were used to gauge the ZOI of potential effects. Where relevant, this is described in Table A4.3.1.

Table A4.3.1 : Screening categories and zones of influence

Screening category	Pathways relevant to the Project	Zone of influence
Physical disturbance	Direct habitat loss or degradation during the construction phase through e.g. topsoil stripping, trench excavation, tracking of machinery, trampling of personnel vegetation removal, storage of materials etc.	Restricted to areas within the demarcated construction zone. Only likely to be significant where the boundary of the Project extends within a European site, or within an offsite area of known foraging, roosting, or breeding habitat (that supports mobile species for which a European site is designated).
	Disturbance of substrates supporting designated habitats or habitats supporting designated species. This could arise as a result of excavation, storage and reinstatement of substrates, substrate compaction and other changes to substrate properties resulting from construction and operation.	Restricted to areas within the demarcated construction zone. Only likely to be significant where the boundary of the Project extends within the boundary of the European site, or within an offsite area of known foraging, roosting, or breeding habitat (that supports mobile species for which a European site is designated).
	Disturbance to qualifying features resulting from habitat fragmentation arising from loss or degradation.	Professional judgement was used to consider the greatest area over which qualifying features could be affected by fragmentation.
Non-physical disturbance	Noise from all vehicular traffic, plant and personnel during construction	There is no current authoritative guidance on distances or thresholds for noise and visual disturbance due to the variability in source activities and sensitivities of ecological receptors. However, effects are only likely to be significant where activities are within or adjacent to a European site or an offsite area of known foraging, roosting or breeding habitat that supports mobile qualifying species. Professional judgement and scientific literature have been used to inform the ZOI based on the qualifying features under consideration.
	Visual disturbance from vehicles, plant and personnel, and temporary lighting used in construction and operation of pipeline.	
Hydrological changes	Changes to surface water levels and flows e.g. changes to surface drainage, or soil compaction leading to reduced infiltration and flooding	Effects only likely to be significant where there is hydrological connectivity between the boundary of the Project and the European site and its qualifying features.
	Changes to groundwater levels and flows, e.g. due to construction vehicles (soil compaction etc.), inadequate soil restoration and presence of the pipeline as a physical barrier	
Toxic contamination	Air emissions associated with vehicular traffic and plant during construction.	The guidance on ZOI for effects of air emissions most relevant to the Project is for road projects, which advises that effects are only likely to be significant where emissions are within 200m of the boundary of the European site (Highways Agency, 2007). However, this Project differs greatly from road projects (in respect of emissions to air) e.g. any changes would only be experienced during the construction period and there would be no operational effects. As such, Highways England guidance has not been fully relied upon. Professional judgement and scientific literature have been used to further refine the ZOI for individual sites and qualifying features.
	Pollution of surface and groundwater, e.g. accidental spillages during construction, pipeline leaks during operation, nutrients and heavy metals entering water following topsoil stripping.	Effects of water pollution could be experienced within the same fluvial or groundwater catchment if hydrological connectivity exists. The distance between the source and any receptors and their location in the catchment are also relevant, and the ZOI of any effects has therefore been assessed on a case-by-case basis.
	Pollution of soils, e.g. nutrients and heavy metals leached to ground following topsoil stripping.	The effects of soil contamination would only likely be experienced within the footprint or immediate vicinity of the source, unless there are hydrological influences.
Non-toxic contamination	Release of dust during construction, e.g. following excavation, tracking of machinery and storage of soils.	Dust effects for ecological receptors during the construction stage are assessed up to 50m from the Project boundary (IAQM, 2014).

Screening category	Pathways relevant to the Project	Zone of influence
	Changes to water chemistry, including changes in nutrient levels (eutrophication) and turbidity, resulting e.g. from run-off from stripped areas and storage mounds.	Hydrological contamination is only likely to be significant where the boundary of the Project extends within the same ground or surface water catchment as the European site. However, these effects are dependent on hydrological continuity between the Project and the European site, and sometimes, whether the Project is up or down stream from the European site.
	Introduction or spread of invasive non-native species (INNS), e.g. due to plant movements or ground disturbance.	Effects associated with INNS are only likely to be experienced within the immediate vicinity of areas where machinery movements, soil stripping and storage would be undertaken. However, there is potential for wider effects to occur where works are within the vicinity of flowing watercourses.
	Changes to soil chemistry, e.g. due to the introduction of new materials such as aggregate for temporary construction compounds.	The effects of soil contamination would only likely be experienced within the footprint or immediate vicinity of the source, unless there are hydrological influences.

3.4 Assessment of Likely Significant Effects

3.4.1 This preliminary assessment is only possible at this stage due to the predictable nature of most potential impacts associated with pipeline construction and operation. With a few exceptions, most impacts would be restricted to within the Order Limits and would be temporary, short-duration and reversible.

3.4.2 Decommissioning activities would be subject to an appropriate decommissioning strategy, as per Chapter 3 Description of the Development. It is not practical to assess the effects of decommissioning at this stage as the methodology and likely good practice mitigation measures will not be defined until closer to the time, at least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

3.4.3 Consideration was given to the European sites located within the ZOIs described in Table A4.3.1, taking account of the interest features present. The outcomes from this process were used to populate Screening matrices to determine LSE.

3.4.4 The HRA Screening process is underpinned by an interpretation of LSE. The terms 'likely' and 'significance' have been defined variously by governments and through the courts. The following sections seek to provide clarification on the current interpretation of these terms as determined by recent guidance and case law.

The Likely Significant Effects Test

An interpretation of 'likely'

3.4.5 The two defining cases on the meaning of an LSE are provided in *Bagmoor Wind Ltd v The Scottish Ministers* (CSIH 93) and *Feeney v Secretary of State for Transport* (CO/12946/2012). The cases establish that the term 'likely' should not be regarded as a measure of probability in the context of an HRA but instead infers the presence of a risk. An LSE finding is therefore an acknowledgment that the risk of a significant effect occurring exists.

3.4.6 The above rulings are consistent with the Advocate General's opinion in *Sweetman v An Bord Pleanála* (C.M.L.R. 16) and with the findings in the Waddenzee judgement (*Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij* (C-521/12)). The former of these judgments found that *"…there is no need to establish such an effect; it is merely necessary to determine that there may be such an effect*".

3.4.7 The Waddenzee judgment clarifies the benchmark for a determination of an LSE and that *"…if it cannot be excluded, on the basis of objective information, that [the works under consideration] will have a significant effect on that site…*" then an LSE finding is appropriate. There must remain "*no reasonable scientific doubt as to the absence of such effects.*"

3.4.8 Planning Inspectorate guidance also advises that if a large amount of evidence and data gathering is necessary to determine LSE, it is assumed that LSEs likely exist and an Appropriate Assessment is likely required (Planning Inspectorate, 2017).

An interpretation of 'significant' under the Habitats Directive

3.4.9 It was clarified in the Waddenzee judgment (Case C-127/02 Waddenzee, para 49) that the measure of significance should be made against the Conservation Objectives for which the site was designated: "*where a plan or project […] is likely to undermine the site's Conservation Objectives, it must be considered likely to have a significant effect on that site*".

Mitigation Measures to Avoid Likely Significant Effects

3.4.10 Mitigation refers to measures proposed to avoid or reduce adverse environmental effects.

3.4.11 Until recently, mitigation aimed at avoiding or reducing significant effects to European sites was considered to be appropriate 'objective information' about a plan or project and was taken into account at the screening stage, in accordance with the *Wadenzee* judgement. Moreover, in *R (Hart D C) v SSCLG and others* (EWHC 1204 (Admin)) the judgement was that:

"... *there is no legal requirement that a screening assessment ... must be carried out in the absence of any mitigation measures that form part of a plan or project. On the contrary, the competent authority is required to consider whether the project, as a whole, including such measures, if they are part of the project, is likely to have a significant effect*...".

3.4.12 However, in April 2018 a converse decision was reached by the Court of Justice of the European Union (CJEU) in *People Over Wind and Sweetman v Coillte Teoranta* (C-323/17) which stated that:

"... *Article 6(3) of the Habitats Directive must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site.*"

3.4.13 There has been no guidance from Natural England on how to interpret or apply the *People Over Wind and Sweetman* ruling to the HRA process in the UK, and it appears to contradict previous case law and practice in the way that mitigation is assessed during the screening stage. In the absence of guidance, this ruling has been considered when describing and assessing mitigation proposed as part of the Project.

3.5 In-combination Assessment

Introduction

3.5.1 The Habitats Directive requires that an HRA must assess whether a project would be likely to have a significant effect on a European site "*either individually or in combination with other plans or projects*". The Directive recognises that in some cases the effects of a project or plan on its own would be either unlikely or insignificant but may have a LSE in combination with other plans and projects.

Identification of other Relevant Plans and Projects

3.5.2 The in-combination component of the LSE test needs to focus only on those plans or projects that potentially could interact with the Project. In this respect the in-combination assessment must consider whether:

- The effects of the plans and projects, in combination, would make effects more likely to occur, or more likely to occur at significant levels, that alone would be unlikely to either occur or be significant.
- The effects of the plans and projects, in combination, would make insignificant effects significant.
- The effects of the plans and projects, in combination, would generate new or different effects that would not occur if the plans and projects proceeded alone.

3.5.3 *Advice Note 10* (Planning Inspectorate, 2017) recommends at least the following plans and project be considered in the in-combination assessment for DCO applications:

- projects that are under construction;
- permitted application(s) not yet implemented;
- submitted application(s) not yet determined;
- all refusals subject to appeal procedures not yet determined;
- projects on the National Infrastructure's programme of projects; and
- projects identified in the relevant development plan (and emerging development plans – with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited and the degree of uncertainty which may be present.

3.5.4 A desk top review of the planning applications and any proposed developments in the vicinity of the Project will be undertaken. Planning applications held by the local planning authorities along the selected route will be retrieved and reviewed. Relevant NSIPs subject to the DCO process under the Planning Act 2008 will also be reviewed.

3.5.5 Rejected and withdrawn planning applications will be scoped out of the assessment, as they are not reasonably foreseeable developments. Sites allocated for development in Local Plans or other Development Plans, which are not yet subject to planning applications, will not be included in the assessment as they are not yet proposed developments and would be unlikely to have temporal overlaps with this Project.

3.5.6 New housing developments within 5km of the Thames Basin Heaths SPA could generate in-combination effects with the Project due to disturbance caused by increased recreational activities. However, as the effects of housing developments are mitigated through enforcement of the Thames Basin Heaths Special Protection Area Delivery Framework, in-combination effects via this pathway will be discounted and will not be considered by this assessment (Thames Basin Heaths Joint Strategic Partnership Board, 2009).

3.5.7 To ensure consistency with the Project's cumulative effects assessment in the ES (as

set out in Chapter 16 (Cumulative Effects) of the Scoping Report), the approach to identifying other relevant plans or projects also takes into account guidance from *Advice Note 17 Cumulative Effects Assessment* (Planning Inspectorate, 2015). This advises the following stages to the assessment:

- Stage 1: Establish the project's ZOI and identify a long list of 'other developments';
- Stage 2: Identify a shortlist of 'other developments' by applying inclusion or exclusion criteria to the long list in Stage 1;
- Stage 3: Gather available information regarding the shortlisted developments; and,
- Stage 4: Carry out an assessment of the shortlisted developments using information gathered in Stage 3.

3.5.8 At Stage 1, *Advice Note 17* recommends allocation of 'Tiers' to the identified developments depending on various factors. Any development that meets the criteria of one of the Tiers should be considered in the assessment and categorised accordingly. The three Tiers are:

Tier 1

- Permitted application (s), whether under the Planning Act 2008 (DCLG, 2015) or other regimes (including planning applications), but not yet implemented; and
- Submitted application(s) whether under the Planning Act 2008 or other regimes but not yet determined.

Tier 2

- Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has been submitted.

Tier 3

- Projects on the Planning Inspectorate's Programme of Projects where a Scoping report has not been submitted;
- Identified in the relevant Development Plan (and emerging Development Plans with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals would be limited; and,
- Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

3.5.9 *Advice Note 17* also recognises that for each Tier, there is a decreasing level of detail likely to be available for the developments.

3.5.10 The current assessment has incorporated this guidance into the methodology, a summary of which is provided in Table A4.3.2. Professional judgment has been used in the selection of developments to establish the Long List.

Table A4.3.2 Summary of approach used to identify other plans or projects for the in-combination assessment

Assessment stage	Description
Stage1 Establish ZOI and identify a long list of 'other developments'	The ZOIs are as per those described in Table A4.3.1. ZOIs are typically expected to be restricted to within 200m of the route (based on the ZOI for air quality change) unless there is hydrological connectivity to vulnerable European sites e.g. those sensitive to hydrological change or contamination. As such, the following developments will be identified: • NSIPs on the Planning Inspectorate's Programme of Projects within 200m of the route or with hydrological pathways to vulnerable European sites identified by this study. • Major Developments (as defined under Development Management Procedure (England) Order 2010) within 200m of the route or with hydrological pathways to vulnerable European sites identified by this study. • Minor planning applications, e.g. local planning application for garage extension, within 200m of the route only.
Stage 2 Identify shortlist of selected developments	The 'Long List' will been filtered by the following criteria to create a 'Short List'. • Temporal scope (whether the development would be potentially carried out concurrently with the Project). • Nature and size of the development.

3.6 Sources of Information

3.6.1 This study to inform HRA Screening used information drawn from a number of sources, including guidance on assessment methodology, information on European sites and scientific literature.

3.6.2 Information relevant to European sites was based on:

- publically available information about sites, such as that provided by the Joint Nature Conservation Committee (JNCC) and Natural England;
- environmental records within 1km of the route, obtained from local records centres; and
- records of breeding sites of the qualifying species of the Thames Basin Heaths SPA between 2007 and 2017 from within 1km of the route, obtained from 2Js Ecology.

3.6.3 Information used in the in-combination assessment was based on:

- national plans;
- information about local plans and planning applications available from local authority websites; and
- information held by the Planning Inspectorate on its National Infrastructure Planning website.

4. Screening Results

4.1 Source-Receptor Pathways

4.1.1 Based on the Order Limits, construction methodologies and anticipated ZOIs, source-receptor pathways to seven European sites have been identified:

- Solent and Southampton Water SPA (UK9011061);
- Solent Maritime SAC (UK0030059);
- Solent and Southampton Water Ramsar site (UK11063);
- South West London Waterbodies SPA (UK9012171);
- South West London Waterbodies Ramsar site (UK11065);
- Thames Basin Heaths SPA (UK9012141); and
- Thursley, Ash, Pirbright and Chobham SAC (UK0012793).

4.1.2 Further information on these sites is provided in Appendix D and summarised in Table A4.4.1. The location of the sites in relation to the route are shown in Appendix A.

4.1.3 The identified source-receptor pathways between the route and the above European sites are summarised in Table A4.4.1.

4.1.4 As the South West London Waterbodies Ramsar site is identical in extent and interest features to the South West London Waterbodies SPA, a screening assessment for the Ramsar site has not been repeated and is not referred to further in this report.

Table A4.4.1 : Source-receptor pathways to European sites identified as part of the Stage 1 screening assessment for the Project.

European site	Location and distance of European site from the Project	European site primary reasons for selection and other qualifying interests	Screening category				
			Physical disturbance	Non-physical disturbance	Hydrological changes	Toxic contamination	Non-toxic contamination
Solent and Southampton Water SPA	The route crosses two tributaries of the River Hamble, at approximately 1.5km north west and upstream of the SPA, and approximately 6km north and upstream of the SPA	This site qualifies by supporting populations of European importance of the following species listed on Annex I of the Birds Directive during the breeding season: • Common tern (*Sterna hirundo*) • Little tern (*Sterna albifrons*) • Mediterranean gull (*Larus melanocephalus*) • Roseate tern (*Sterna dougallii*) • Sandwich tern (*Sterna sandvicensis*) This site also qualifies by supporting populations of European importance of the following migratory species during winter: • Black-tailed godwit (*Limosa limosa islandica*) • Dark-bellied Brent goose (*Branta bernicla bernicla*) • Ringed plover (*Charadrius hiaticula*) • Teal (*Anas crecca*) The area also qualifies by supporting a winter assemblage of international importance, regularly supporting 53,948 individual waterfowl.	No source-receptor pathways identified	**Source:** *Construction:* noise generated by vehicles and plant; visual stimuli generated by movements of vehicles, plant and operatives *Operation:* stimuli generated by maintenance vehicles etc. over lifetime of pipeline **Pathway:** Wintering qualifying species present in or near to the route **Potential effects:** Disturbance of birds causing changes to foraging behaviour, loss of condition etc.	No source-receptor pathways identified	**Source:** *Construction:* accidental spillages; plant leaks etc. *Operation:* pipeline leaks **Pathway:** Hydrological connectivity **Potential effects:** Damage or loss of habitats supporting qualifying species	**Source:** *Construction:* substrate excavations generating silt and nutrient run-off into watercourses. **Pathway:** Hydrological connectivity **Potential effects:** Damage or loss of habitats supporting qualifying species
Solent Maritime SAC	The route crosses two tributaries of the River Hamble, at approximately 1.5km north west and upstream of the SPA, and approximately 6km north and upstream of the SPA	Habitats listed on Annex I of the Habitats Directive that are a primary reason for selection of this site: • 1130 Estuaries • 1320 Spartina swards (*Spartion maritimae*) • 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: • 1110 Sandbanks which are slightly covered by sea water all the time	No source-receptor pathways identified	No source-pathways identified	No source-receptor pathways identified	**Source:** *Construction:* accidental spillages; plant leaks etc. *Operation:* pipeline leaks **Pathway:** Hydrological connectivity **Potential effects:** Damage or loss of qualifying habitats and habitat	**Source:** *Construction:* substrate excavations generating silt and nutrient run-off into watercourses. **Pathway:** Hydrological connectivity **Potential effects:** Damage or loss of qualifying habitats and habitat supporting qualifying species

European site	Location and distance of European site from the Project	European site primary reasons for selection and other qualifying interests	Screening category				
			Physical disturbance	Non-physical disturbance	Hydrological changes	Toxic contamination	Non-toxic contamination
		• 1140 Mudflats and sandflats not covered by seawater at low tide • 1150 Coastal lagoons (146.16ha) • 1210 Annual vegetation of drift lines • 1220 Perennial vegetation of stony banks • 1310 *Salicornia* and other annuals colonizing mud and sand • 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes") Species listed on Annex II of Habitat Directive present as a qualifying feature, but not a primary reason for selection of this site: • Desmoulin's whorl snail (*Vertigo moulinsiana*)				supporting qualifying species	

Solent and Southampton Water Ramsar site	The route crosses two tributaries of the River Hamble, at approximately 1.5km north west and upstream of the SPA, and approximately 6km north and upstream of the SPA	• The site is one of the few major sheltered channels between a substantial island and mainland in European waters. It includes many wetland habitats characteristic of the biogeographic region: saline lagoons, saltmarshes, estuaries, intertidal flats, shallow coastal waters, grazing marshes, reedbeds, coastal woodland and rocky boulder reefs.
		• The site supports an important assemblage of rare plants and invertebrates.
		• Assemblages of international importance, peak winter counts of 51,343 waterfowl
		• Species/populations occurring at levels of international importance:
		  • Black-tailed godwit
		  • Dark-bellied brent goose
		  • Ringed plover
		  • Teal
			No source-receptor pathways identified	**Source:** *Construction:* Noise generated by vehicles and plant; visual stimuli generated by movements of vehicles, plant and operatives *Operation:* stimuli generated by maintenance vehicles etc. over lifetime of pipeline **Pathway:** Wintering qualifying species present in or near to the route **Potential effects:** Disturbance of birds causing changes to foraging behaviour, loss of condition etc.	No source-receptor pathways identified	**Source:** *Construction:* Accidental spillages; plant leaks etc. *Operation:* pipeline leaks **Pathway:** Hydrological connectivity **Potential effects:** Damage or loss of qualifying habitats and habitat supporting qualifying species	**Source:** *Construction:* Substrate excavations generating silt and nutrient run-off into watercourses. **Pathway:** Hydrological connectivity **Potential effects:** Damage or loss of qualifying habitats and habitat supporting qualifying species

South West	The closest point between the	This site qualifies by supporting	No source-receptor	**Source:**	No source-receptor	**Source:**	**Source:**

European site	Location and distance of European site from the Project	European site primary reasons for selection and other qualifying interests	Screening category				
			Physical disturbance	**Non-physical disturbance**	**Hydrological changes**	**Toxic contamination**	**Non-toxic contamination**
London Waterbodies SPA	SPA and route is approximately 650m to the east of Staines Moor SSSI. The route passes near to three groups of lakes within the wider complex of waterbodies in the south west London area known to be important in sustaining populations of the qualifying species of the SPA, and crosses surface water bodies connected to these lakes.	populations of European importance of the following migratory species during winter: • Gadwall (*Anas strepera*) • Shoveler (*Anas clypeata*)	pathways identified	*Construction:* Noise generated by vehicles and plant; visual stimuli generated by movements of vehicles, plant and operatives *Operation:* stimuli generated by maintenance vehicles etc. over lifetime of pipeline **Pathway:** Wintering qualifying species present at lakes near to route **Potential effects:** Disturbance of birds causing changes to foraging behaviour, loss of condition etc.	pathways identified	*Construction:* Accidental spillages; plant leaks etc. *Operation:* pipeline leaks **Pathway:** Hydrological connectivity **Potential effects:** Damage or loss of habitat supporting qualifying species	Substrate excavations generating silt and nutrient run-off into watercourses **Pathway:** Hydrological connectivity **Potential effects:** Damage or loss of habitat supporting qualifying species **Source:** *Construction:* Movement of invasive non-native species by vehicles and operatives **Pathway:** Hydrological connectivity **Potential effects:** Changes to habitat supporting qualifying species, with loss of winter roosting or foraging resources
South West London Waterbodies Ramsar site	As for South West London Waterbodies SPA						
Thames Basin Heaths SPA	The route passes through or is adjacent to four component sites of the SPA: • Bourley and Long Valley SSSI – within the SPA for a distance of approximately 1.5km. • Chobham Common SSSI – within the SPA for a distance of approximately 2.5km. • Colony Bog and Bagshot Heaths SSSI – within the	This site qualifies by supporting populations of European importance of the following species listed on Annex I of the Birds Directive during the breeding season: • Dartford warbler (*Sylvia undata*); • nightjar (*Caprimulgus europaeus*); and • woodlark (*Lullula arborea*).	**Source:** *Construction:* Vegetation clearance; construction of site compounds; damage by vehicles and plant; trampling by operatives **Pathway:** Route is within SPA, and would affect breeding habitat of qualifying species **Potential effects:** Loss of breeding habitat of qualifying breeding species	**Source:** *Construction:* Within the SPA, noise generated by vehicles and plant; visual stimuli generated by movements of vehicles, plant and operatives *Operation:* stimuli generated by maintenance	No source-receptor pathways identified	**Source:** *Construction:* Accidental spillages; plant leaks etc. *Operation:* Pipeline leaks **Pathway:** Route is within SPA – toxic contamination **Potential effects:**	**Source:** *Construction:* Emissions from vehicles and plant; dust generated by works **Pathway:** Route is within SPA – change in air quality within SPA effecting sensitive habitats supporting qualifying species

European site	Location and distance of European site from the Project	European site primary reasons for selection and other qualifying interests	Screening category				
			Physical disturbance	Non-physical disturbance	Hydrological changes	Toxic contamination	Non-toxic contamination
	SPA for a distance of approximately 4km. • Eelmoor Marsh SSSI – outside the site, but immediately adjacent to its northern boundary for approximately 350m. The route is also located within Crookham Park (Queen Elizabeth Barracks) and Chertsey Meads, both SANGS sites (SANGS sites are areas of strategic green space identified, maintained and/or created in order to relieve recreational pressure on the Thames Basin Heaths SPA, required by local plans to be secured as part of new housing developments). The route is also located within the proposed SANGS at Southwood Golf Course, near Farnborough.		of SPA, leading to changes in habitat structure/connectivity, breeding failure, population changes	vehicles etc. over lifetime of pipeline **Pathway:** Qualifying species present in or near to the route within the SPA **Potential effects:** Disturbance of birds causing changes to behaviour, breeding failure, population changes		Damage or loss of habitat supporting qualifying species	**Potential effects:** Damage or loss of breeding habitat of qualifying species
				Source: *Construction:* Outside the SPA, noise generated by vehicles and plant; visual stimuli generated by movements of vehicles, plant and operatives *Operation:* stimuli generated by maintenance vehicles etc. over lifetime of pipeline **Pathway:** Displacement of recreational activities from SANGS to SPA during construction/ operational works **Potential effects:** Disturbance of birds causing changes to behaviour, breeding failure, population changes			**Source:** *Construction:* Substrate excavations generating silt and nutrient run-off **Pathway:** Route is within SPA – hydrological connectivity **Potential effects:** Silting or eutrophication of sensitive habitats supporting qualifying features – Damage or loss of breeding habitat
							Source *Construction:* Movement of invasive non-native species by vehicles and operatives; disturbance of ground leading to spread of invasive non-native plant species **Pathway:** Route is within SPA – spread to or within SPA **Potential effects:**

European site	Location and distance of European site from the Project	European site primary reasons for selection and other qualifying interests	Screening category				
			Physical disturbance	Non-physical disturbance	Hydrological changes	Toxic contamination	Non-toxic contamination
							Changes to habitat structure and function – Damage or loss of habitat supporting qualifying species
Thursley, Ash, Pirbright and Chobham SAC	The route passes through two component sites of the SAC: • Chobham Common SSSI – within the SPA for a distance of approximately 2.5km. • Colony Bog and Bagshot Heaths SSSI – within the SPA for distance of approximately 4km.	Habitats listed on Annex I of the Habitats Directive that are a primary reason for selection of this site: • 4010 North Atlantic wet heaths with *Erica tetralix* • 4030 European dry heaths • 7150 Depressions on peat substrates of the *Rhynchosporion*	**Source:** *Construction:* Vegetation clearance; construction of site compounds; damage by vehicles and plant; trampling by operatives **Pathway:** Route is within SAC, and would affect qualifying habitats **Potential effects:** Damage or loss of qualifying habitats, changes in habitat connectivity, density, extent	No source-receptor pathways identified	**Source:** *Construction:* Excavation, handling, storage and reinstatement of substrates; compaction from vehicles and plant; dewatering; changes in topography and surface drainage *Operation:* Presence of pipeline in ground **Pathway:** Route is within SAC - Changes to ground and surface water hydrology **Potential effects:** Changes to hydrological regimes of sensitive qualifying habitats - Damage or loss of qualifying habitats, changes in habitat connectivity, density, extent	**Source:** *Construction:* Accidental spillages; plant leaks etc. *Operation:* Pipeline leaks **Pathway:** Route is within SAC – toxic contamination **Potential effects:** Damage or loss of qualifying habitats, changes in habitat connectivity, density, extent	**Source:** *Construction:* Emissions from vehicles and plant; dust generated by works **Pathway:** Route is within SPA – change in air quality within SAC, effecting sensitive habitats **Potential effects:** Habitats supporting qualifying species of SPA are sensitive to change in air quality – Damage or loss of breeding habitat of qualifying species
			Source: *Construction:* Excavation, handling, storage and reinstatement of substrates; compaction from vehicles and plant **Pathway:** Route is within SAC - Changes in properties of substrates supporting sensitive qualifying habitats, e.g. chemistry, nutrient cycling **Potential effects:** Damage or loss of qualifying habitats, changes in habitat connectivity, density, extent, changes in soil ecology				**Source:** *Construction:* Substrate excavations generating silt and nutrient run-off **Pathway:** Route is within SAC – hydrological connectivity **Potential effects:** Silting or eutrophication of sensitive qualifying – Damage or loss of qualifying habitats, changes in habitat connectivity, density, extent
							Source:

European site	Location and distance of European site from the Project	European site primary reasons for selection and other qualifying interests	Screening category				
			Physical disturbance	Non-physical disturbance	Hydrological changes	Toxic contamination	Non-toxic contamination
							Construction: Introduction of non-native materials into ground as part of pipeline installation, e.g. aggregates, concrete *Operation:* Long-term presence of non-native materials in ground **Pathway**: Route is within SAC – Leaching of non-inert materials into SAC **Potential effects:** Changes in chemistry and function of substrates supporting qualifying habitats - Damage or loss of qualifying habitats, changes in habitat connectivity, density, extent
							Source: *Construction:* Movement of invasive non-native species by vehicles and operatives; disturbance of ground leading to spread of invasive non-native plant species **Pathway**: Route is within SAC – spread to or within SAC **Potential effects:** Changes to habitat structure and function – Damage or loss of qualifying habitats,

European site	Location and distance of European site from the Project	European site primary reasons for selection and other qualifying interests	Screening category				
			Physical disturbance	Non-physical disturbance	Hydrological changes	Toxic contamination	Non-toxic contamination
							changes in habitat connectivity, density, extent

4.2 Summary of Assessment of Likely Significant Effects (alone)

4.2.1 The full study to inform the HRA screening assessment for LSEs to the European sites identified above is presented in the screening matrices given in Appendix D. The results of this study are summarised in Table A4.4.2.

4.2.2 Of the seven European sites identified, LSE are not anticipated to: Solent and Southampton Water SPA/Ramsar, Solent Maritime SAC or the South West London Waterbodies SPA/Ramsar. These sites have been 'screened out'.

4.2.3 LSE to the Thames Basin Heaths SPA are not predicted due to the implementation of embedded mitigation. Despite this, further guidance from Natural England is required to inform whether this site would require a Stage 2 Appropriate Assessment based on the *People over Wind and Sweetman* ruling.

4.2.4 At present, LSE cannot be screened out for Thursley, Ash, Pirbright and Chobham SAC and this site should be considered at Stage 2 Appropriate Assessment.

4.3 In-combination Assessment

4.3.1 At this early stage in the Project, a comprehensive in-combination assessment has not yet been undertaken as the route and Order Limits have not been finalised. This element of the assessment will be completed in the next version of this study to inform an HRA which will be provided to Natural England prior to the application for development consent.

Table A4.4.2 : Summary of assessment of LSE for identified source-receptor pathways.

European site	Source-receptor pathway	Assessment of LSE	Outcome of screening
Solent and Southampton Water SPA	Noise and visual disturbance of wintering qualifying species of the SPA present in the wider landscape beyond the SPA	The route is situated outside core potential roosting and foraging zones of qualifying species of the SPA. Any effect of disturbance of qualifying species of the SPA would therefore likely be *de minimis*.	No LSE
	Toxic and non-toxic contamination of surface water bodies connected to the SPA, downstream of route watercourse crossing locations	The two watercourses that would be crossed by the route are very small in comparison to the large freshwater and estuarine systems that comprise the SPA and which supports the qualifying species of the site. There would also be a large distance between the SPA and the route. Any effect of contamination would therefore likely be *de minimis*. Any risk of effects would be further controlled by embedded mitigation or industry standard good practice mitigation: one of the watercourses would be crossed using trenchless techniques, and construction and operation would be subject to standard good practice measures (these measures are not proposed due to the presence of the SPA and LSE are not predicted in the absence of mitigation).	No LSE
Solent Maritime SAC	Toxic and non-toxic contamination of surface water bodies connected to the SAC, downstream of route watercourse crossing locations	The two watercourses that would be crossed by the route are very small in comparison to the large freshwater and estuarine systems that comprise the SAC and which supports the qualifying species of the site. There would also be a large distance between the SAC and the route. Any effect of contamination would therefore likely be *de minimis*. Any risk of effects would be further controlled by embedded mitigation or industry standard good practice mitigation: one of the watercourses would be crossed using trenchless techniques, and construction and operation would be subject to standard good practice measures (these measures are not proposed due to the presence of the SPA and LSE are not predicted in the absence of mitigation).	No LSE
Solent and Southampton Water Ramsar site	Noise and visual disturbance of wintering qualifying bird species of the Ramsar site present in the wider landscape beyond the Ramsar site	The route is situated outside core potential roosting and foraging zones of qualifying bird species of the Ramsar site. Any effect of disturbance of qualifying species of the Ramsar site would therefore likely be *de minimis*.	No LSE
	Toxic and non-toxic contamination of surface water bodies connected to the Ramsar site, downstream of route watercourse crossing locations	The two watercourses that would be crossed by the route are very small in comparison to the large freshwater and estuarine systems that comprise the Ramsar site and which supports the qualifying features of the site. There would also be a large distance between the Ramsar site and the route. Any effect of contamination would therefore likely be *de minimis*. Any risk of effects would be further controlled by embedded mitigation or industry standard good practice mitigation: one of the watercourses would be crossed using trenchless techniques, and construction and operation would be subject to standard good practice measures (these measures are not proposed due to the presence of the SPA and LSE are not predicted in the absence of mitigation).	No LSE
South West London Waterbodies SPA and Ramsar	Noise and visual disturbance of wintering qualifying bird species of the SPA present at waterbodies important to the SPA near to the route	Qualifying wintering species using waterbodies near the route would readily be able to disperse and find alternative nearby habitat if disturbed as a result of Project activities. There are also existing structures and vegetation between the route and nearby waterbodies that would buffer noise or visual stimuli. Existing levels of noise and visual disturbance along the route are also such that birds are likely habituated to anthropogenic disturbance similar to that generated by the Project. Any effect of disturbance would therefore likely be *de minimis*.	No LSE
	Toxic and non-toxic contamination of surface water bodies important to the SPA, downstream of route watercourse crossing locations	The potential for contamination of waterbodies connected to the SPA would be controlled by industry standard good practice as part of the design, construction and operation of the pipeline. These measures are not proposed due to the presence of the SPA and would be implemented throughout the Project. However, with such measures in place, this pathway would not lead to LSE.	No LSE

European site	Source-receptor pathway	Assessment of LSE	Outcome of screening
	Spread of invasive non-native species to waterbodies important to the SPA near to the route	Industry standard good practice measures would be in place in order to control the spread of invasive non-native species to the SPA, with the result that effects would be unlikely. These measures are not proposed due to the presence of the SPA and would be implemented throughout the Project.	No LSE
Thames Basin Heaths SPA	Clearance, or other damage during construction, of supporting habitat of qualifying species	The area of habitat that would be lost as a result of construction is expected to be small compared to the total area of the site (this would be quantified once the route has been finalised). All loss of habitat suitable for the qualifying species of the SPA would be temporary, as such habitat would be restored following construction. Restored habitat is anticipated to develop into a condition suitable for the qualifying species in 2-3 years. During the development of restored habitat, there will be a large alternative resource of suitable breeding habitat available for the qualifying species. This is supported by a desk study of breeding territories of qualifying species within the SPA component sites that would be affected by the Project. This showed that the qualifying species breed in habitats widely distributed across the SPA and its component SSSIs. This suggests that there is suitable alternative breeding habitat available. In summary, given the small scale and temporary scale of habitat loss resulting from the Project, any effects to the SPA are considered to be *de minimis*.	No LSE
	Noise and visual disturbance of breeding qualifying species within the SPA	It is embedded into the Project's programme that all main construction works within the SPA would be scheduled for completion between 1st October and 31st January. This would avoid the period during which the qualifying species would be breeding. Any effects that may arise due to disturbance within this period are considered to be *de minimis*.	No LSE but consideration at Stage 2 Appropriate Assessment may be required.
	Noise and visual disturbance of breeding qualifying species within the SPA due to displacement of recreational activities from SANGS along route to SPA	It is not possible to estimate the number of people whose recreational activity could be displaced into the SPA as a result of construction works within SANGS. However, given the short duration and limited extent of the works within these sites, it is not predicted that sufficient numbers of people to generate significant levels of disturbance would be displaced. Any effects that may arise due to disturbance via this pathway are therefore likely to be *de minimis*.	No LSE
	Spread of invasive non-native species to or within the SPA	The spread of invasive non-native species would be controlled by good practice, which would be in place across the Project, regardless of potential for effects to European sites. LSE are considered not likely to result via this pathway.	No LSE
	Toxic and non-toxic contamination of ground- and surface waterbodies connected to the SPA	Toxic and non-toxic contamination of ground- and surface waterbodies would be controlled by standard construction good practice, which would be secured through the CoCP, regardless of potential for effects to European sites. LSE are considered not likely to result via this pathway.	No LSE
	Air quality effecting supporting habitat of the qualifying species of the SPA	Given the relatively small scale, localised nature, and short duration of the works, any changes to air quality within the SPA are considered to be *de minimis* without further mitigation. Changes to air quality arising from the generation of dust would also be controlled by industry standard good practice which would be secured through the CoCP. LSE are not predicted in absence of this mitigation.	No LSE
Thursley, Ash, Pirbright and Chobham SAC	Clearance of qualifying habitat, or other direct damage during construction	Based on priority habitat information available from Natural England, the area of 'European dry heaths' within the Order Limits are estimated to comprise approximately 1% of the area of this habitat within the SAC. It is more difficult to estimate the area of water-dependent qualifying habitat based on this objective information, (e.g. the area of 'Depressions on peat substrates of the Rhynchosporion' within the Order Limits could represent 18% of this feature within the SAC), although impacts to all of it are unlikely given the proposed embedded and good practice mitigation. The exact route of the pipeline across Chobham Common SSSI has yet to be determined although the Order Limits at this location have been kept wide to allow for greater route flexibility. Further assessment would be	Consider at Stage 2 Appropriate Assessment

European site	Source-receptor pathway	Assessment of LSE	Outcome of screening
		required to refine this alignment but impacts would be reduced through the use of embedded and good practice mitigation, such as minimising the construction footprint. Following construction works, habitat impacted would be restored following good practice methods and so any loss would be temporary. For dry heathland habitats (i.e. the 'European dry heaths' feature) the likely restoration methods are consistent with standard conservation measures for the restoration and management of heathlands (e.g. natural regeneration following topsoil stripping), and there is confidence that this habitat can be fully reinstated. Given the relatively small area of loss and reinstatement measures proposed, the effect on the SAC in respect of the 'European dry heaths' feature is considered to be *de minimis*. For water-dependent qualifying habitats (i.e. 'Atlantic wet heaths with Erica tetralix' and 'Depressions on peat substrates of the Rhynchosporion'), methods of restoration are less certain in their efficacy. There is therefore uncertainty about how either of these features could be effected by the Project. As the Order Limits could support as much as 18% of the overall qualifying feature within the SAC, this pathway could lead to LSE and should be considered at Appropriate Assessment (unless the route is subject to significant change, in which case it would be re-screened at Stage 1).	
	Changes to hydrological function of sensitive qualifying habitats of the SAC	The qualifying features 'Atlantic wet heaths with Erica tetralix' and 'Depressions on peat substrates of the *Rhynchosporion'* are water-dependent, and are very sensitive to changes in the supply and quality of water. There is currently uncertainty about the location, extent and hydroecological function of these water-dependent habitats within the SAC. How they would interact with construction and operation of the pipeline is also unknown. At this stage of the Project, there is no detailed mitigation proposed that could reduce beyond reasonable scientific doubt impacts of construction activities to water-dependent qualifying habitats, or for restoration of water-dependent qualifying habitats. As there is a need for further detailed information and mitigation, the pathway for LSE by hydrological changes should be considered at Appropriate Assessment. If the route is subject to significant change, it should be re-screened at Stage 1.	Consider at Stage 2 Appropriate Assessment
	Spread of invasive non-native species to or within the SAC	The spread of invasive non-native species would be controlled by standard good practice, which would be in place across the Project, regardless of potential for effects to European sites. LSE are considered not likely to result via this pathway.	No LSE
	Toxic and non-toxic contamination of ground- and surface waterbodies within the SAC	Toxic and non-toxic contamination of ground- and surface waterbodies would be controlled by standard construction good practice, which would be in place across the Project and secured through the CoCP, regardless of potential for effects to European sites. LSE are considered not likely to result via this pathway.	No LSE
	Air quality changes effecting qualifying habitats within the SAC	Given the relatively small scale, localised nature, and short duration of the works, any changes to air quality within the SPA are considered to be *de minimis* without further mitigation. Changes to air quality arising from the generation of dust would also be controlled by industry standard good practice secured through the CoCP. LSE are not predicted in absence of this mitigation.	No LSE
	Changes, including physical structure and chemistry, of substrates supporting qualifying habitats of the SAC	The use as part of pipeline construction of concrete or other kinds of material not native to the SAC has the potential to cause changes to chemistry of substrates within the SAC (e.g. pH). This could result in long-term effects leading to degradation or loss of qualifying habitats, and could be difficult to mitigate. Presently, there is no information on the kind of materials that might be required to support the installation or whether they would be necessary within the SAC. As there is a need for further information, the pathway for LSE by changes to substrate properties should therefore be considered at Appropriate Assessment (or re-screened at Stage 1 if the design changes significantly).	Consider at Stage 2 Appropriate Assessment

5. Conclusion

5.1.1 Based on the preliminary information presented in this report, it is considered that no LSE would arise as a result of the Project *alone* to the Solent and Southampton Water SPA/Ramsar, Solent Maritime SAC or the South West London Waterbodies SPA/Ramsar. Significant effects *alone* at these sites are considered not likely largely due to the distance between these sites and the route.

5.1.2 LSE are not anticipated either alone or in combination with other plans or projects to the Thames Basin Heaths SPA. This is largely due to the proposed timing of the construction works, which would avoid periods when the qualifying bird species would be breeding, and to proposed habitat restoration. However, based on the *People Over Wind and Sweetman* ruling, the Thames Basin Heaths SPA may require consideration at Stage 2 Appropriate Assessment. Further advice from Natural England is required to confirm this.

5.1.3 Based on the available information, it is not yet possible to conclude that there would be no LSEs to Thursley, Ash, Pirbright and Chobham SAC. Based on the current proposals, this site should be assessed at Stage 2 Appropriate Assessment.

5.1.4 At this early stage of the Project, it is not considered appropriate to undertake an in-combination assessment. The conclusions summarised above are therefore based on effects of the Project when considered alone. The results of an in-combination assessment will be provided in the next version of this study to inform an HRA, which would be provided to Natural England prior to the application for development consent.

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Appendix A. Figures

Figure A4.1 : The route and European sites relevant to the screening assessment

Figure A4.2 : The route, Littleton Lane waterbodies and Queen Mary Reservoir

Figure A4.3 : The route within Bourley and Long Valley SSSI

Figure A4.4 : The route within Colony Bog and Bagshot Heath SSSI

Figure A4.5 : The route within Chobham Common SSSI

Figure A4.6 : The route in relation to Eelmoor Marsh SSSI

Figure A4.7 : The route in relation to SANGS

Appendix B. Site photograph

Plate 1: Littleton Lane viewed from the entrance to Littleton Sailing Club (right of view north, left of view south) showing woodland/scrub/hedgerow screening on both sides of the lane, and industrial area on the western side of the lane. Photograph taken 06/06/2018

Plate 2: Littleton Sailing Club lake, viewed from the Club car park looking north east, showing the dense woodland/scrub/hedgerow screening the lake from Littleton Lane to the west (left of view). Photograph taken 06/04/2018

Plate 3: Colony Bog and Bagshot Heath SSSI, view from route along track, looking east. Dry heathland with scattered birch and pine saplings. Photo taken 27/02/2018

Plate 4: Colony Bog and Bagshot Heath SSSI, view from route along track, looking south. Folly Bog in valley bottom with dry heath in foreground. Photo taken 22/03/2018

	
Plate 5: Colony Bog and Bagshot Heath SSSI, view from route along track, looking west. Bracken-dominated heathland with scattered birch and pine saplings. Photo taken 27/02/2018	**Plate 6: Colony Bog and Bagshot Heath SSSI, view from route along track, looking east. Wet and dry heath around track. Photo taken 27/02/2018**

Appendix C. Thames Basin Heaths SPA Desk Study

Figure A4.8: Dartford warbler breeding sites recorded since 2008 at Bourley and Long Valley SSSI within 1km of the route. Data obtained from 2Js Ecology

Figure A4.9: Nightjar breeding sites recorded since 2008 at Bourley and Long Valley SSSI within 1km of the route. Data obtained from 2Js Ecology

Figure A4.10: Woodlark breeding sites recorded since 2008 at Bourley and Long Valley SSSI within 1km of the route. Data obtained from 2Js Ecology

Figure A4.11: Dartford warbler breeding sites recorded since 2008 at Chobham Common SSSI within 1km of the route. Data obtained from 2Js Ecology

Figure A4.12: Nightjar breeding sites recorded since 2008 at Chobham Common SSSI within 1km of the route. Data obtained from 2Js Ecology

Figure A4.13: Woodlark breeding sites recorded since 2008 at Chobham Common SSSI within 1km of the route. Data obtained from 2Js Ecology

Figure A4.14: Dartford warbler breeding sites recorded since 2008 at Colony Bog and Bagshot Heath SSSI within 1km of the route. Data obtained from 2Js Ecology

Figure A4.15: Nightjar breeding sites recorded since 2008 at Colony Bog and Bagshot Heath SSSI within 1km of the route. Data obtained from 2Js Ecology

Figure A4.16: Woodlark breeding sites recorded since 2008 at Colony Bog and Bagshot Heath SSSI within 1km of the route. Data obtained from 2Js Ecology

Figure A4.17: Dartford warbler breeding sites recorded since 2008 at Eelmoor Marsh SSSI within 1km of the route. Data obtained from 2Js Ecology

Figure A4.18: Nightjar breeding sites recorded since 2008 at Eelmoor Marsh SSSI within 1km of the route. Data obtained from 2Js Ecology

Figure A4.19: Woodlark breeding sites recorded since 2008 at Eelmoor Marsh SSSI within 1km of the route. Data obtained from 2Js Ecology

Appendix D. Screening Matrices

D.1 Solent and Southampton Water SPA

Table A4.6.1: Screening matrix for Solent and Southampton Water SPA (adapted from Highways Agency, 2009)

Characteristics of European site (JNCC, 2015; Natural England, 2014)	
European site name / code	Solent and Southampton Water SPA / UK9011061
Location and distance of European site from the proposed works	Solent and Southampton Water SPA is located approximately 1.5km south east of the route
European site area	5,505.86ha
European site primary reasons for selection and other qualifying interests	This site qualifies under Article 4.1 of the Birds Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: During the breeding season: • Common tern (*Sterna hirundo*), 267 pairs representing at least 2.2% of the breeding population in Great Britain (5-year peak mean, 1993-1997) • Little tern (*Sterna albifrons*), 49 pairs representing at least 2.0% of the breeding population in Great Britain (5-year peak mean, 1993-1997) • Mediterranean gull (*Larus melanocephalus*), 2 pairs representing at least 20.0% of the breeding population in Great Britain (5-year peak mean, 1994-1998) • Roseate tern (*Sterna dougallii*), 2 pairs representing at least 3.3% of the breeding population in Great Britain (5-year peak mean, 1993-1997) • Sandwich tern (*Sterna sandvicensis*), 231 pairs representing at least 1.7% of the breeding population in Great Britain (5-year peak mean, 1993-1997) This site also qualifies under Article 4.2 of the Birds Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: Over winter: • Black-tailed godwit (*Limosa limosa islandica*), 1,125 individuals representing at least 1.6% of the wintering Iceland - breeding population (5-year peak mean, 1992/3-1996/7)

	• Dark-bellied brent goose (*Branta bernicla bernicla*), 7,506 individuals representing at least 2.5% of the wintering Western Siberia/Western Europe population (5-year peak mean, 1992/3-1996/7) • Ringed plover (*Charadrius hiaticula*), 552 individuals representing at least 1.1% of the wintering Europe/Northern Africa - wintering population (5-year peak mean, 1992/3-1996/7) • Teal (*Anas crecca*), 4,400 individuals representing at least 1.1% of the wintering north western Europe population (5-year peak mean, 1992/3-1996/7) The area qualifies under Article 4.2 of the Birds Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl: • Over winter, the area regularly supports 53,948 individual waterfowl (5-year peak mean 1991/2 - 1995/6) including: gadwall (*Anas strepera*), teal, ringed plover, black-tailed godwit, little grebe (*Tachybaptus ruficollis*), great crested grebe (*Podiceps cristatus*), cormorant (*Phalacrocorax carbo*), dark-bellied brent goose, wigeon (*Anas penelope*), redshank (*Tringa totanus*), pintail (*Anas acuta*), shoveler (*Anas clypeata*), red-breasted merganser (*Mergus serrator*), grey plover (*Pluvialis squatarola*), lapwing (*Vanellus vanellus*), dunlin (*Calidris alpina alpina*), curlew (*Numenius arquata*), shelduck (*Tadorna tadorna*).
Vulnerability of European site	• Changes in abiotic conditions • Changes in biotic conditions • Fishing and harvesting aquatic resources • Outdoor sports and leisure activities, recreational activities • Pollution to groundwater (point sources and diffuse sources)
European site Conservation Objectives	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring: • the extent and distribution of the habitats of the qualifying features; • the structure and function of the habitats of the qualifying features; • the supporting processes on which the habitats of the qualifying features rely; • the population of each of the qualifying features; and • the distribution of the qualifying features within the site.
Description of project	
Size and scale	A full description of all relevant project details is given in Section 2 of this report and Chapter 3 (Description of the Development) of the Scoping Report.
Distance from the European site or	The route would be across two small tributaries of the River Hamble: A Main River known as Ford Lake at SU 51563 14714 near Boorley Green approximately 1.5km due north west and upstream of the SPA;

key features of the site	and, an unnamed Ordinary Watercouse at SU 53574 17990 in Wintershill approximately 6km due north and upstream of the SPA. It is currently expected that the first watercourse would be crossed using trenchless techniques; the crossing of the second, smaller watercourse would use an open cut trench. See Figure A4.1 for crossing point locations.
Land-take	No land-take from the SPA would be required as part of the Project. All land-take for the Project would be temporary, comprising trenching, haul routes, compound sites etc. required to construct the pipeline, and once works were complete all land would be restored to its former use/condition.
Resource requirements	No resources from the SPA or from areas in proximity to the SPA would be required as part of the Project.
Emissions	The construction works for the Project would require plant and machinery that have the potential to generate dust and local emissions. The Project also has the potential to generate emissions (toxic and non-toxic) to ground- and surface water bodies connected to the River Hamble upstream of the SPA, either during construction or as a result of pipe leaks during operation. Toxic emissions could be generated during construction by spillages of fuels or leaking construction plant. Non-toxic emissions could be generated during construction by uncontrolled silting of waterbodies or the discharge of nutrient-enriched runoff as a result of the excavations. Toxic emissions could be generated during pipeline operation as a result of pipeline leaks.
Excavation requirements	No excavation works would take place within the SPA as part of the Project.
Traffic and transportation requirements	There are no traffic and transportation requirements relevant to the SPA as part of the Project. Traffic and transport would be confined to the Order Limits of the pipeline and to highways, and would comprise transport of plant, equipment, structures, materials and personnel.
Duration of construction, operation etc.	The Project is planned to commence main construction in March 2021, with construction lasting up to two years. Enabling works may commence before March 2021 at specific locations, for example vegetation removal, installation of fencing, or compound creation. The pipeline would be constructed in phases, with the duration of each construction phase depending on local conditions but expected to be around one to two months. Further details of constructions timelines will be confirmed as the Project design and programme develops. The design life of the replacement pipeline is 60 years. Pipeline operation would be supported by monitoring of pipeline condition and maintenance. Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area. Esso operates robust procedures to manage the pipeline and prevent leakage.

Description of avoidance and/or mitigation measures	
Nature of proposals	There is no mitigation as part of the Project proposed specifically to address potential LSE to the SPA. However, the use of trenchless construction techniques under the Ford Lake and the adoption of suitable construction methods and good practice would further reduce the risk of effects to the SPA. Chapter 4 (Design Evolution) of the Scoping Report outlines the proposed good practice mitigation. Good practice measures would be secured by a CoCP and implemented and controlled by a CEMP. Construction would not commence until these documents had been submitted and approved by the competent authority or their statutory advisor.
Location	There is no mitigation as part of the Project proposed specifically to address potential effects to the SPA. Construction good practice measures would operate across the route as a whole.
Evidence for effectiveness	There is no mitigation as part of the Project proposed specifically to address potential effects to the SPA. Good practice guidelines are established and promoted by relevant environmental and construction institutions to ensure projects are delivered in compliance with required standards, policy and legislation. It is a standard approach to implement good practice guidelines regardless of whether LSE are anticipated or not.
Mechanisms for delivery (legal conditions, restrictions or other legally enforceable obligations)	All good practice measures would be secured and delivered through a CoCP. Outline information is provided in Chapter 4 (Design Evolution) of the Scoping Report. A final version of the CoCP would be provided to support the Project's application for development consent. Construction good practice is achieved through regular site audits by appropriately experienced ECoW.
Assessment criteria	
Initial assessment	
Disturbance to qualifying species or their supporting habitats	
For the duration of construction of the Project there would be changes to noise and visual stimuli generated by movement of plant and personnel within the construction area, excavation and other groundworks, and transport. During operation, such changes would be limited in frequency, duration and intensity, e.g. to routine or emergency maintenance of the pipeline. Anthropogenic noise and visual changes have well-documented disturbance effects on bird species, resulting in both behavioural and population changes (Latimer *et al*., 2003). The potential impacts of noise and visual disturbance to qualifying species of the SPA as a result of the Project should therefore be considered. There is no current authoritative guidance on how far a noise study area should extend from construction activities due to the variability of the potential noise generating activities. However, based on professional judgement, the effects of noise and visual disturbance are only likely to be significant where the boundary of the Project extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of	

known foraging, roosting or breeding habitat that supports mobile animal species for which a European site is designated.

Given the above, the Project is considered sufficiently distant from the SPA (1.5km) and Project activities relatively minor in the disturbance generated (e.g. there would be no high-disturbance events, such as rock blasting or other controlled explosions, piling etc.) that noise disturbance is unlikely to have any effect on qualifying features within the SPA. Similarly, at such a distance visual disturbance to the SPA would not be expected to result from Project activities.

Outside the SPA, the route supports arable fields, agricultural and other grassland habitats, as well as human conurbations. Although the SPA supports predominantly coastal and freshwater wetlands and marine habitats, some qualifying species of the SPA use inland habitats for foraging and roosting during the winter, e.g. brent geese utilise cereal fields close to the coast and species such as lapwing disperse more widely to use farmland habitats. There could therefore, be the potential for disturbance to arise to qualifying species of the SPA using such habitats.

The core and potential roosting and foraging zones of qualifying species of the SPA have been mapped by the Solent Waders and Brent Goose Strategy (Solent Waders and Brent Goose Strategy, 2017). The route falls outside these zones. Any effect of disturbance, therefore, would likely be *de minimis*. Moreover, suitable habitat such as arable fields are abundant in the landscape around the route. As such, any qualifying species of the SPA present outside these zones that may be temporarily displaced for the duration of the Project would likely find suitable alternative resource nearby without detriment to SPA populations.

Any other indirect disturbance pathways, such as visual disturbance due to changes to landscape structure during construction that would be visible from the air during migration, are likely to be insignificant due to the small scale and temporary nature of the Project in the context of the wider landscape. The Project is therefore not considered likely to generate noise and visual disturbance to qualifying species of the SPA present outside the SPA that would lead to LSE.

Reduction in habitat area

Physical loss of habitat supporting qualifying species

In order to construct the Project, terrestrial habitat would need to be temporarily destroyed or damaged by digging the pipeline trench and topsoil stripping. During operation, habitat impacts would not arise with the exception of very rare occasions when very small and localised excavations may be required to inspect the pipeline. As the route would not be within the SPA, any effect to qualifying species as a result of habitat loss could only result where the Project would potentially damage or destroy suitable foraging, roosting or breeding habitat outside the European site.

The route supports arable fields, agricultural and other grassland habitats. Although the SPA supports predominantly coastal and freshwater wetlands and marine habitats, some qualifying species of the SPA use inland habitats for foraging and roosting during the winter, e.g. brent geese utilise cereal fields close to the coast and species such as lapwing disperse more widely to use farmland habitats. There could therefore be the potential for effects to qualifying species of the SPA due to temporary loss of these habitats.

The core and potential roosting and foraging zones of qualifying species of the SPA have been mapped by the Solent Waders and Brent Goose Strategy (Solent Waders and Brent Goose Strategy, 2017). The route falls outside these zones. Suitable habitat such as arable

fields are abundant in the landscape around route. As such, any qualifying species of the SPA displaced by Project activities would likely readily find suitable resource nearby without detriment to SPA populations. The Project requires no permanent land-take (with the exception of minor land-take for valves and a new pigging station near Boorley Green) and all habitat would be restored to its former type and as the potential wintering habitats of qualifying species of the SPA along the route (e.g. arable fields) are readily restored, it is therefore unlikely that there would be any significant long-term effect of habitat loss to qualifying species of the SPA as a result of the Project.

Loss of habitat supporting qualifying species of SPA due to toxic or non-toxic contamination

The SPA is beyond the 200m zone of influence within which emissions or fugitive dust from the construction are likely to have a significant impact on the habitats supporting qualifying species of the SPA (Highways Agency, 2007; IAQM, 2014).

The project has low potential to generate minor emissions (toxic and non-toxic) to ground- and surface water bodies as a result of construction activities (accidental spillages, silting etc.) and operation of the pipeline (leaks). As the route crosses tributaries of the River Hamble upstream of the SPA, there is a theoretical pathway for effects to occur to the SPA, which could cause destruction or damage of habitats supporting qualifying species of the SPA.

However, the two watercourses that would be crossed by the route are very small in comparison to the large freshwater and estuarine systems that comprise the SPA and which supports the qualifying species of the site, and there would be a large distance between the SPA and any point of discharge of contaminants to these watercourses.

The construction of the Project across the tributary of the River Hamble at Ford Lake by trenchless techniques would further reduce the low risk of surface water contamination as machinery would be working at distance from the watercourse. Directional drilling at this location is proposed for construction reasons and not because there is a theoretical pathway for effects to the SPA, and therefore does not constitute mitigation to avoid or reduce effects to the SPA.

Moreover, the risk of pollution events occurring during construction are considered to be extremely low because potential sources of contamination (e.g. vehicles, plant or fuel) would typically not come into contact with the water environment. During open-trenching across watercourses, machinery would work within the watercourse for the shortest possible period of time and construction good practice and pollution prevention measures (e.g. following the guidance of DEFRA and EA, 2016) would be adhered to at all times and at all watercourses, as outlined in Chapter 4 (Design Evolution) of the Scoping Report. These measures would be secured through a CoCP and delivered through a CEMP. The good practice working methods would be adopted across the whole project for works affecting the water environment, regardless of potential pathways to European sites.

The risk of operational contamination is also considered to be extremely low due to the design of the pipeline and monitoring that would occur throughout its operational lifetime. Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area. Esso operates robust procedures to manage the pipeline and prevent leakage.

Given the above, the risk of toxic or non-toxic contamination of the SPA as a result of the Project is considered to be extremely low and so no LSE would arise.

Habitat or species fragmentation

The Project would not take place within the SPA and so there would be no habitat or species fragmentation within the site itself. Outside the SPA, as the qualifying species are highly mobile birds able to fly large distances in order to disperse and migrate, it is considered that the local scale of any habitat loss for the Project would not impair the qualifying species from moving about the landscape. Any effect of landscape fragmentation resulting from the Project would therefore not be significant to the SPA.
Reduction in species/habitat density
As the Project would not take place within the SPA there would be no direct effect causing reduction in species/habitat density within the SPA. Outside the SPA, any reduction or change in species/habitat density within the route would be very local and temporary and, as described above, would not represent changes to core or potential areas of roosting or foraging habitat. It is therefore considered that any changes to habitat density as a result of the Project would not be significant for the SPA. In terms of changes in density as a result of mortality of qualifying species of the SPA occupying suitable habitat along the route, this is considered unlikely to occur as the species are readily disturbed and very mobile i.e. they would be unlikely to come into conflict with construction machinery. As suitable habitat for the qualifying species outside of the SPA is widely available in the surrounding landscape, changes in density resulting from dispersal are considered not likely to be significant for populations of the qualifying species of the SPA.
Changes in key indicators of conservation value (water quality etc.)
The Conservation Objectives for the SPA cite the following as key attributes against which conservation success can be measured: extent and distribution of the habitats of qualifying species; the population of each of the qualifying species; and the distribution of the qualifying species within the site. As described above, the Project would not result in direct changes to habitat within the SPA, while indirect potential impacts resulting from changes in air quality and emissions to ground- and surface waterbodies connected to the SPA that could destroy or damage habitats are unlikely to occur. The adoption of standard good practice construction measures would also further reduce any risk as part of the Project (such measures would not be implemented as mitigation and LSE would not arise in their absence). Furthermore, any destruction or damage to habitats outside of the SPA as a result of the Project is considered unlikely to result in any or significant changes to populations of qualifying species of the SPA, as described above. Other changes in indicators of conservation value, such as the spread of invasive non-native species to the SPA, are not considered likely over such a great distance from the route.
Climate change
Activities associated with the Project would be of short duration and any changes to the landscape local and temporary. It is therefore considered that the Project is unlikely to effect the SPA in combination with long-term landscape changes that might occur as a result of climate change.

Likely impacts on the European site as a whole in terms of
Interference with the key relationships that define the structure of the site
As described above, the Project would not have any direct effect on habitats or qualifying species within the SPA, and any effects outside the SPA are considered likely to be non-significant to the SPA. Thus any structural elements important to the Conservation Objectives of the SPA, such as species assemblages and supporting habitats, are not likely to be significantly affected by the Project.
Interference with the key relationships that define the function of the site
The functional link between the SPA and the Project comprises the two small tributaries of the River Hamble that would be crossed during construction. As the qualifying species of the SPA and supporting habitats are dependent upon hydrological, geomorphological and marine processes (flooding of grazing marshes, tidal and fluvial dynamics etc.) that operate over a much larger scale than that of the Project (the SPA itself has an area of 5,505.86ha), any hydrological modifications to the watercourses should they occur as a result of the Project are considered not likely to have a significant effect on the SPA.
Significance as a result of the identification of effects set out above in terms of:
Disturbance to key species
No LSE are anticipated based on the information provided above.
Reduction of habitat areas
No LSE are anticipated based on the information provided above.
Habitat or species fragmentation
No LSE are anticipated based on the information provided above.
Fragmentation
No LSE are anticipated based on the information provided above.
Disruption
No LSE are anticipated based on the information provided above.
Disturbance
No LSE are anticipated based on the information provided above.
Changes to key elements of the site (e.g. water quality, hydrological regime etc.)
No LSE are anticipated based on the information provided above.
Of the above, elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known
No LSE anticipated or uncertainties identified based on the information provided above.
Outcome of screening stage
No LSE are anticipated based on the information provided above.

D.2 Solent Maritime SAC

Table A4.6.2: Screening matrix for Solent Maritime SAC (adapted from Highways Agency, 2009)

Characteristics of European site (Natural England, 2014; JNCC, 2015)	
European site name / code	Solent Maritime SAC (UK0030059)
Location and distance of European site from the proposed works	Solent Maritime SAC is located approximately 1.5km south east of the route.
European site area	11,243.12ha
European site primary reasons for selection and other qualifying interests	Annex I habitats that are a primary reason for selection of this site: • 1130 Estuaries (6633.44ha) • 1320 Spartina swards (Spartion maritimae) (94.44ha) • 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (2023.76ha) Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: • 1110 Sandbanks which are slightly covered by sea water all the time (3597.8ha) • 1140 Mudflats and sandflats not covered by seawater at low tide (5059.4ha) • 1150 Coastal lagoons (146.16ha) • 1210 Annual vegetation of drift lines (112.43ha) • 1220 Perennial vegetation of stony banks (112.43ha) • 1310 *Salicornia* and other annuals colonizing mud and sand (123.67ha) • 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (“white dunes”) (112.43ha) Annex II species present as a qualifying feature, but not a primary reason for selection of this site: • Desmoulin’s whorl snail (*Vertigo moulinsiana*)
Vulnerability of European site	• Changes in abiotic conditions • Changes in biotic conditions • Fishing and harvesting aquatic resources • Outdoor sports and leisure activities, recreational activities • Pollution to groundwater

European site Conservation Objectives	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • the extent and distribution of qualifying natural habitats and habitats of qualifying species; • the structure and function (including typical species) of qualifying natural habitats; • the structure and function of the habitats of qualifying species; • the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; • the populations of qualifying species; and • the distribution of qualifying species within the site.
Description of project	
Size and scale	A full description of all relevant project details is given in Section 2 of this report and Chapter 3 (Description of the Development) of the Scoping Report.
Distance from the European site of key features of the site	The route would be across two small tributaries of the River Hamble: A Main River known as Ford Lake at SU 51563 14714 near Boorley Green approximately 1.5km due north west and upstream of the SPA; and, an unnamed Ordinary Watercouse at SU 53574 17990 in Wintershill approximately 6km due north and upstream of the SPA. It is currently expected that the first crossing would be achieved through trenchless techniques beneath the watercourse; the crossing of the second, smaller watercourse would use an open cut trench. See Figure A4.1 for crossing point locations.
Land-take	No land-take from the SAC would be required as part of the Project. All land-take for the Project would be temporary, comprising trenching, haul routes, compound sites etc. required to construct the pipeline, and once works were complete all land would be restored to its former use/condition.
Resource requirements (from the European site of from areas in proximity to the site)	No resources from the SAC or from areas in proximity to the SAC would be required as part of the Project.
Emissions	The construction works for the Project would require plant and machinery that have the potential to generate dust and local emissions. The Project also has the potential to generate emissions (toxic and non-toxic) to ground- and surface water bodies connected to the River Hamble upstream of the SAC, either during construction or as a result of pipe leaks during operation. Toxic emissions could be generated

	during construction by spillages of fuels or leaking construction plant. Non-toxic emissions could be generated during construction by uncontrolled silting of waterbodies or the discharge of nutrient-enriched runoff as a result of excavations. Toxic emissions could be generated during pipeline operation as a result of pipeline leaks.
Excavation requirements	No excavation works would take place within the SAC as part of the Project.
Transportation requirements	There are no traffic and transportation requirements relevant to the SAC as part of the Project. Traffic and transport would be confined to the Order Limits of the pipeline and to highways, and would comprise transport of plant, equipment, structures, materials and personnel.
Duration of construction, operation etc.	The Project is planned to commence main construction in March 2021, with construction lasting up to two years. Enabling works may commence before March 2021 at specific locations, for example vegetation removal, installation of fencing, or compound creation. The pipeline would be constructed in phases, with the duration of each construction phase expected to last between one to two months depending on local conditions. The design life of the replacement pipeline is 60 years. Pipeline operation would be supported by monitoring of pipeline condition and maintenance. Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area. Esso operates robust procedures to manage the pipeline and prevent leakage.
Description of avoidance and/or mitigation measures	
Nature of proposals	There is no mitigation as part of the Project proposed specifically to address potential LSE to the SAC. However, trenchless techniques under the Ford Lake and the adoption of suitable construction methods and good practice would further reduce the risk of effects to the SAC. Chapter 4 (Design Evolution) of the Scoping Report outlines the proposed good practice mitigation. Good practice measures would be secured by a CoCP and implemented and controlled by a CEMP. The CEMP would contain all relevant method statements. Construction would not commence until these documents had been submitted and approved by the competent authority or their statutory advisor.
Location	There is no mitigation as part of the Project proposed specifically to address potential LSE to the SAC. Construction good practice would operate across the route as a whole.
Evidence for effectiveness	Good practice guidelines are established and promoted by relevant environmental and construction institutions to ensure projects are delivered in compliance with required standards, policy and legislation. It is a standard approach to implement good practice guidelines during projects of this type, regardless of whether LSE are anticipated or not.

Mechanisms for delivery (legal conditions, restrictions or other legally enforceable obligations)	All good practice measures would be secured and delivered through a CoCP. Outline information is provided in Chapter 4 (Design Evolution) of the Scoping Report. A final version of the CoCP would be provided to support the Project's application for development consent. Construction good practice is achieved through regular site audits by appropriately experienced clerks of works (e.g. an ecologist).
Assessment criteria	
Initial assessment	
Disturbance to key species or habitats	
The qualifying habitats of the SAC are not sensitive to disturbance. The sensitivity to disturbance of the qualifying species of the SAC, Desmoulin's whorl snail, is unknown. However, as a highly sedentary animal located at least 1.5km from the route, it is considered that effects due to disturbance of SAC populations as a result of the project are not likely and so LSE would not arise through this impact pathway.	
Reduction of habitat area	
<u>Physical loss of qualifying habitat and habitat supporting qualifying species of SAC</u> The route is not within the SAC. There would be no direct loss in area of qualifying habitats or habitat within the SAC supporting the qualifying species as a result of the Project. No areas of Annex I habitats that are qualifying features of the SPA would be lost outside of the SAC as a result of the Project. <u>Loss of habitat supporting qualifying species of SAC due to toxic or non-toxic contamination</u> The SPA is beyond the 200m zone of influence within which emissions or fugitive dust from the project construction are likely to have a significant impact on the qualifying habitats or habitats supporting qualifying species of the SAC (Highways Agency, 2007; IAQM, 2014). The Project has very low potential to generate minor emissions (toxic and non-toxic) to ground- and surface water bodies as a result of construction activities (accidental spillages, silting etc.) and operation of the pipeline (leaks). As the route crosses tributaries of the River Hamble upstream of the SAC, there is a theoretical pathway for effects to occur to the SAC. This could cause destruction or damage of qualifying habitats and habitats supporting qualifying species of the SAC. However, the two watercourses that would be crossed by the route are very small in comparison to the large freshwater and estuarine systems that comprise the SAC and which supports the qualifying habitats and habitat supporting the qualifying species of the site. There would also be a large distance between the SAC and any point of discharge of contaminants to these watercourses. The construction of the Project across the tributary of the River Hamble at Ford Lake by trenchless techniques would also further reduce the low risk of surface water contamination as machinery would be working at distance from the watercourse. The use of trenchless techniques at this location is proposed for construction reasons and not because there is a theoretical pathway for effects to the SAC, and therefore does not constitute mitigation to avoid or reduce effects to the SAC. Moreover, the risk of pollution events occurring during construction are considered to be extremely low because potential sources of contamination (e.g. vehicles, plant or fuel) would typically not come into contact with the water environment. During open-trenching	

across watercourses, machinery would work within the watercourse for the shortest possible period of time and construction good practice and pollution prevention measures (e.g. following the guidance of DEFRA and EA, 2016) would be adhered to at all times and at all watercourses. These good practice working methods would be adopted across the whole project for works affecting the water environment, regardless of potential pathways to European sites. The risk of operational contamination is also considered to be extremely low due to the design of the pipeline and monitoring that would occur throughout its operational lifetime. Indeed, Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area. Esso operates robust procedures to manage the pipeline and prevent leakage. Adherance to engineering good practice and professional standards of pipeline design and monitoring would mitigate the likelihood/impact of leaks during operation. These would be delivered through the pipeline operator's good practice and regulatory requirements. Given the above, the risk of toxic or non-toxic contamination of the SAC as a result of the Project is not considered likely and no LSE would arise.
Habitat or species fragmentation
The route is not within the SAC and so that there would be no direct loss in area of qualifying habitats or habitat supporting the qualifying species. As such, there would be no habitat or species fragmentation as a result of the Project.
Reduction in species/habitat density
The route is not within the SAC and so that there would be no direct loss of areas of qualifying habitats or habitat supporting the qualifying species. The Project would therefore not affect the densities of qualifying habitats or the qualifying species of the SAC.
Changes in key indicators of conservation value (water quality etc.)
The Conservation Objectives for the SAC cite the following as key attributes against which conservation success can be measured: the extent and distribution of qualifying habitats and habitats of qualifying species; and the populations and distributions of qualifying species. As described above, the Project would not result in direct changes to habitat within the SAC, while potential indirect potential impacts resulting from changes in air quality and emissions to ground- and surface waterbodies connected to the SAC that could destroy or damage habitats are extremely unlikely to occur. The adoption of standard good practice construction measures would also further reduce any risk as part of the Project (such measures would not be implemented as mitigation and LSE would not arise in their absence). Other changes in indicators of conservation value, such as the spread of invasive non-native species to the SAC, are not considered likely over such a great distance from the route.
Climate change
Activities associated with the Project would be of short duration and any changes to the landscape local and temporary. It is therefore considered that the Project is unlikely to

effect the SAC in combination with long-term landscape changes that might occur as a result of climate change.
Likely impacts on the European site as a whole in terms of
Interference with the key relationships that define the structure of the site
As described above, the Project would not have any direct effect on qualifying habitats or qualifying species within the SAC. Thus any structural elements important to the Conservation Objectives of the SAC are not likely to be affected by the Project.
Interference with the key relationships that define the function of the site
The functional link between the SAC and the Project comprises the two small tributaries of the River Hamble that would be crossed during construction. As the qualifying habitats and species of the SAC are dependent upon hydrological, geomorphological and/or marine processes (flooding of grazing marshes, tidal and fluvial dynamics etc.) that operate over a much larger scale than that of the Project (the SAC itself has an area of 11,243.12ha), any hydrological modifications to the watercourses should they occur as a result of the Project are considered not likely to have a significant effect on the SAC.
Significance as a result of the identification of effects set out above in terms of:
Disturbance to key species
No LSE are anticipated based on the information provided above.
Reduction of habitat areas
No LSE are anticipated based on the information provided above.
Habitat or species fragmentation
No LSE are anticipated based on the information provided above.
Fragmentation
No LSE are anticipated based on the information provided above.
Disruption
No LSE are anticipated based on the information provided above.
Disturbance
No LSE are anticipated based on the information provided above.
Changes to key elements of the site (e.g. water quality, hydrological regime etc.)
No LSE are anticipated based on the information provided above.
Of the above, elements of the Project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known
No LSE anticipated or uncertainties identified based on the information provided above.
Outcome of screening stage
No LSE are anticipated based on the information provided above.

D.3 Solent and Southampton Water Ramsar Site

Table A4.6.3: Screening matrix for Solent and Southampton Water Ramsar Site (adapted from Highways Agency, 2009)

Characteristics of European sites (JNCC, 1998)	
European site name / code	Solent and Southampton Water Ramsar Site / UK11063
Location and distance of European site from the proposed works	Solent and Southampton Water Ramsar Site is located approximately 1.5km south east of the route
European site area	5,346.44ha
European site primary reasons for selection and other qualifying interests	• Ramsar criterion 1 The site is one of the few major sheltered channels between a substantial island and mainland in European waters, exhibiting an unusual strong double tidal flow and has long periods of slack water at high and low tide. It includes many wetland habitats characteristic of the biogeographic region: saline lagoons, saltmarshes, estuaries, intertidal flats, shallow coastal waters, grazing marshes, reedbeds, coastal woodland and rocky boulder reefs. • Ramsar criterion 2 The site supports an important assemblage of rare plants and invertebrates. At least 33 British Red Data Book invertebrates and at least eight British Red Data Book plants are represented on site. • Ramsar criterion 5 Assemblages of international importance: Species with peak counts in winter: 51,343 waterfowl (5-year peak mean 1998/99-2002/2003) • Ramsar criterion 6 – species/populations occurring at levels of international importance Qualifying Species/populations (as identified at designation): Species with peak counts in spring/autumn: • Ringed plover (*Charadrius hiaticula*), 397 individuals, representing an average of 1.2% of the GB population (5-year peak mean 1998/9- 2002/3) Species with peak counts in winter: • Black-tailed godwit (*Limosa limosa islandica*), 1,240 individuals, representing an average of 3.5% of the population (5-year peak mean 1998/9-2002/3)

	• Dark-bellied brent goose, (*Branta bernicla bernicla*), 6,456 individuals, representing an average of 3% of the population (5-year peak mean 1998/9- 2002/3) • Teal (*Anas crecca*), 5,514 individuals, representing an average of 1.3% of the population (5-year peak mean 1998/9-2002/3)
Vulnerability of European site	There are no specified vulnerabilities for this site, but based on those of the Solent and Southampton Water SPA and Solent Maritime SAC, with which the Ramsar site is coincident, the following have been identified: • Changes in abiotic conditions • Changes in biotic conditions • Fishing and harvesting aquatic resources • Outdoor sports and leisure activities, recreational activities • Pollution to groundwater (point sources and diffuse sources)
European site Conservation Objectives	There are no specified vulnerabilities for this site, but based on those of the Solent and Southampton Water SPA and Solent Maritime SAC, with which the Ramsar site is coincident, the following have been identified. Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring: • the extent and distribution of qualifying natural habitats and habitats of qualifying species; • the structure and function of natural habitats, including qualifying habitats and habitats of qualifying species; • the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and • the populations and distribution of the qualifying species.
Description of project	
Size and scale	A full description of all relevant project details is given in Section 2 of this report and Chapter 3 (Description of the Development) of the Scoping Report.
Distance from the European site of key features of the site	The route would be across two small tributaries of the River Hamble: A Main River known as Ford Lake Stream at SU 51563 14714 near Boorley Green approximately 1.5km due north west and upstream of the SPA; and, an unnamed Ordinary Watercouse at SU 53574 17990 in Wintershill approximately 6km due north and upstream of the SPA. The first crossing would be achieved through the use of trenchless techniques beneath the watercourse; the crossing of the second, smaller watercourse would use an open cut trench. See Figure A4.1 for crossing point locations.
Land-take	No land-take from the Ramsar site would be required as part of the Project. All land-take for the Project would be temporary, comprising

	trenching, haul routes, compound sites etc. required to construct the pipeline, and once works were complete all land would be restored to its former use/condition.
Resource requirements (from the European site of from areas in proximity to the site)	No resources from the Ramsar site or from areas in proximity to the Ramsar site would be required as part of the Project.
Emissions	The construction works for the Project would require plant and machinery that have the potential to generate dust and local emissions. The Project also has the potential to generate emissions (toxic and non-toxic) to ground- and surface water bodies connected to the River Hamble upstream of the Ramsar site, either during construction or as a result of pipe leaks during operation. Toxic emissions could be generated during construction by spillages of fuels or leaking construction plant. Non-toxic emissions could be generated during construction by uncontrolled silting of waterbodies or the discharge of nutrient-enriched runoff as a result of the excavations. Toxic emissions could be generated during pipeline operation as a result of pipeline leaks.
Excavation requirements	No excavation works would take place within the Ramsar site as part of the Project.
Transportation requirements	There are no traffic and transportation requirements relevant to the Ramsar site as part of the Project. Traffic and transport would be confined to the Order Limits of the pipeline and to highways, and would comprise transport of plant, equipment, structures, materials and personnel.
Duration of construction, operation etc.	The Project is planned to commence main construction in March 2021, with construction lasting up to two years. Enabling works may commence before March 2021 at specific locations, for example vegetation removal, installation of fencing, or compound creation. The pipeline would be constructed in phases with the duration of each construction phase expected to last between one to two months, depending on local conditions. Further details of constructions timelines will be confirmed as the Project design and programme develops. The design life of the replacement pipeline is 60 years. Pipeline operation would be supported by monitoring of pipeline condition and maintenance. Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area. Esso operates robust procedures to manage the pipeline and prevent leakage.

Description of avoidance and/or mitigation measures	
Nature of proposals	There is no mitigation as part of the Project proposed specifically to address potential LSE to the Ramsar. However, the use of trenchless techniques under the Ford Lake Stream and the adoption of suitable construction methods and good practice would further reduce the risk of effects to the Ramsar. Chapter 4 (Design Evolution) of the Scoping Report outlines the proposed good practice mitigation. Good practice measures would be secured by a CoCP and implemented and controlled by a CEMP. The CEMP would contain all relevant method statements. Construction would not commence until these documents had been submitted and approved by the competent authority or their statutory advisor.
Location	There is no mitigation as part of the Project proposed specifically to address potential LSE to the Ramsar site. Construction good practice would operate across the route as a whole.
Evidence for effectiveness	Good practice guidelines are established and promoted by relevant environmental and construction institutions to ensure projects are delivered in compliance with required standards, policy and legislation. It is a standard approach to implement good practice guidelines during projects of this type, regardless of whether LSE are anticipated or not.
Mechanisms for delivery (legal conditions, restrictions or other legally enforceable obligations)	All good practice measures would be secured and delivered through a CoCP. Outline information is provided in Chapter 4 (Design Evolution) of the Scoping Report. A final version of the CoCP would be provided to support the Project's application for development consent. Construction good practice is achieved through regular site audits by appropriately experienced clerks of works (e.g. an ecologist).
Assessment criteria	
Initial assessment	
Disturbance to key species or habitats	
<u>Disturbance to birds that are interest features of the Ramsar site</u> For the duration of construction of the Project there would be changes to noise and visual stimuli generated by movement of plant and personnel within the construction area, excavation and other groundworks, and transport. During operation, such changes would be limited in frequency, duration and intensity and are expected to be restricted to routine or emergency inspection or maintenance activities. Anthropogenic noise and visual changes have well-documented disturbance effects on bird species, resulting in both behavioural and population changes (Latimer *et al*., 2003). The potential impacts of noise and visual disturbance to the bird interest features of the Ramsar site as a result of the project should therefore be considered. There is no current authoritative guidance on how far a noise study area should extend from construction activities due to the variability of the potential noise generating activities	

and plant used. However, based on professional judgement, the effects of noise (as well as visual/human presence) are only likely to be significant where the route extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting or breeding habitat that supports mobile animal species for which a European site is designated.

Given the above, the Project is considered sufficiently distant from the Ramsar site (1.5km) and project activities sufficiently minor in their potential to generate significant disturbance events (e.g. there would be no rock blasting or other controlled explosions, piling etc.) that noise disturbance is unlikely to have any effect on bird interest features of the Ramsar site. Similarly, at such a distance visual disturbance to the Ramsar site would not be expected to result from Project activities.

The route supports arable fields, agricultural and other grassland habitats. Although the Ramsar site supports predominantly coastal and freshwater wetlands and marine habitats, some bird interest species of the Ramsar site use inland habitats for foraging and roosting during the winter, e.g. brent geese utilise cereal fields close to the coast and species such as lapwing disperse more widely to use farmland habitats. There is therefore potential for effects to the Ramsar site due to habitat loss or disturbance as a result of Project activities beyond the boundary of the Ramsar site.

The core and potential roosting and foraging zones bird interest features of the Ramsar site have been mapped by the Solent Waders and Brent Goose Strategy (Solent Waders and Brent Goose Strategy, 2017). The route falls outside these zones. Moreover, suitable habitat such as arable fields are abundant in the landscape around the route. As such, any qualifying species of the Ramsar present outside these zones that may be temporarily displaced for the duration of the Project would likely find suitable alternative resource nearby without detriment to Ramsar populations.

Any other indirect disturbance pathways, such as visual disturbance due to changes to landscape structure during construction that would be visible from the air during migration, are also likely to be insignificant due to the small scale and temporary nature of the Project in the context of the wider landscape. The Project is not considered likely to generate noise and visual disturbance to bird interest features present in habitats outside the Ramsar site that would lead to LSE.

Reduction of habitat area

Physical loss of habitat interest features of the Ramsar site

The route is not within the Ramsar site. There would be no direct loss in area of habitat interest features or habitat supporting species interest features either within or outside the Ramsar site.

Physical loss of habitat supporting species interest features of the Ramsar site

In order to construct the project, terrestrial habitat would need to be temporarily destroyed or damaged by construction activities. During operation, habitat impacts would be minimal and would likely only occur during emergency maintenance of the pipeline. As the route would not be within the Ramsar site, any effect to bird interest features as a result of habitat loss could only likely result where the project would potentially damage or destroy suitable foraging, roosting or breeding habitat along the route.

The route supports arable fields, agricultural and other grassland habitats. Although the Ramsar site supports predominantly coastal and freshwater wetlands and marine habitats, some bird interest features of the Ramsar site use inland habitats for foraging and roosting during the winter, e.g. brent geese utilise cereal fields close to the coast and

species such as lapwing disperse more widely to use farmland habitats. There could therefore be the potential for effects to the Ramsar due to habitat loss outside the designated area.

The core and potential roosting and foraging zones of bird interest features of the Ramsar site have been mapped by the Solent Waders and Brent Goose Strategy (Solent Waders and Brent Goose Strategy, 2017). The route falls outside these zones. Moreover, suitable habitat such as arable fields are abundant in the landscape around route. As such, any bird interest features of the Ramsar site displaced by Project activities would likely find suitable alternative resource nearby. The Project requires no permanent land-take (with the exception of minor land-take for valves and a new pigging station near Boorley Green) and all habitat would be restored to its former type. It is therefore considered that there would be no significant effect of habitat loss to the Ramsar site as a result of the Project.

<u>Effects to Ramsar site due to toxic or non-toxic contamination as a result of project activities</u>

The Ramsar site is beyond the 200m zone of influence within which emissions or fugitive dust from construction are likely to have a significant impact on the interest features of the Ramsar site (Highways Agency, 2007; IAQM, 2014).

The Project has low potential to generate minor emissions (toxic and non-toxic) to ground- and surface water bodies as a result of construction activities (accidental spillages, silting etc.) and operation of the pipeline (leaks). As the route crosses tributaries of the River Hamble upstream of the Ramsar site, there is a theoretical pathway for effects which could cause destruction or damage of habitat interest features and/or habitats supporting species interest features of the Ramsar site.

However, the two watercourses that would be crossed by the route are very small in comparison to the large freshwater and estuarine systems that comprise the Ramsar site and which supports the qualifying features. There would also be a large distance between the Ramsar site and any point of discharge of contaminants to these watercourses.

The construction of the Project across the tributary of the River Hamble at Ford Lake by trenchless techniques would also further reduce the low risk of surface water contamination as machinery would be working at distance from the watercourse. The use of trenchless techniques at this location is proposed for construction reasons only and not because there is a theoretical pathway for LSE and therefore this does not constitute mitigation to avoid or reduce effects to the Ramsar site.

Moreover, the risk of pollution events occurring during construction are considered to be extremely low because potential sources of contamination (e.g. vehicles, plant or fuel) would typically not come into contact with the water environment. During open-trenching across watercourses, machinery would work within the watercourse for the shortest possible period of time and construction good practice and pollution prevention measures (e.g. following the guidance of DEFRA and EA, 2016) would be adhered to at all times and at all watercourses. The good practice working methods would be adopted across the whole project for works affecting the water environment, regardless of potential pathways to European sites.

The risk of operational contamination is also considered to be extremely low due to the design of the pipeline and monitoring that would occur throughout its operational lifetime. Indeed, Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area. Esso operates robust procedures to manage the pipeline and prevent leakage.

Adherance to engineering good practice and professional standards of pipeline design and monitoring would mitigate the likelihood/impact of leaks during operation. Given the above, the risk of toxic or non-toxic contamination of the Ramsar site as a result of the Project is not considered likely and no LSE would arise.
Habitat or species fragmentation
Habitat loss can have indirect negative effects due to fragmentation of habitats or populations, impairing the ability of organisms to disperse, fulfil the requirements of their life cycle and thus sustain viable populations. However, as the route is not located within the Ramsar site there would be no habitat or species fragmentation within the site itself. Outside the Ramsar site there is the potential to encounter bird interest features of the site. However, as highly mobile birds able to fly large distances in order to disperse and migrate, it is considered that the local scale of any habitat loss for the project would not impair the bird interest features from moving about the landscape. Any effect of landscape fragmentation resulting from the Project would therefore not be significant to the Ramsar site.
Reduction in species/habitat density
As the route is not located within the Ramsar site there would be no direct effect causing reduction in the density of interest species or habitats within the site. Outside the Ramsar site, it is considered that any reduction or change in species/habitat density would be very local and temporary and would not be significant. There is considered to be no potential for mortality of birds within suitable habitat along the route given the mobility of these animals during the winter and the nature of the Project activities proposed. Disturbance of qualifying species outside of the Ramsar site is not considered likely to cause significant effects due to the availability of extensive areas of alternative habitat within the surrounding landscape. Non-bird interest species of the site are not likely to be present outside the site or to form part of the same populations the site. As such, significant reductions in species/habitat density is not predicted within or outside the Ramsar site and so no LSE would arise.
Changes in key indicators of conservation value (water quality etc.)
The Conservation Objectives for the Solent and Southampton Water SPA and Solent Maritime SAC have been used to infer the key indicators of conservation value of the Ramsar site. The key attributes against which conservation success can be measured are: extent and distribution of the habitats of qualifying species; the population of each of the qualifying species; and the distribution of the qualifying species within the site. As described above, the Project would not result in direct changes to habitat within the Ramsar site. Indirect potential impacts are considered unlikely to occur due to the distances involved, the nature of the Project, and through the adoption of standard good practice measures (these would be implemented irrespective of whether theoretical impact pathways to the Ramsar site exist and are not proposed to reduce the risk of LSE). Furthermore, any destruction or damage to habitats outside of the Ramsar site as a result of the Project is considered extremely unlikely to result in any or significant changes to extent/populations and distributions of habitats/species of interest to the Ramsar site, as described above.

Other changes in indicators of conservation value, such as the spread of invasive non-native species to the Ramsar site, are not considered likely over such a great distance from the route.
Climate change
Activities associated with the Project would be of short duration and any changes to the landscape local and temporary. By appropriately mitigating longer-term risks such as potential risks of contamination during construction and operation of the Project as described above, it is considered that the Project is unlikely to effect the Ramsar site in combination with long-term landscape changes that might occur as a result of climate change.
Likely impacts on the European site as a whole in terms of
Interference with the key relationships that define the structure of the site
As described above, the Project would not have any direct effect on habitats or species of interest for the Ramsar site, and any effects outside the site are considered likely to be non-significant. Thus any structural elements important to the Conservation Objectives of the Ramsar site, such as species assemblages and supporting habitats, are not likely to be significantly affected by the Project.
Interference with the key relationships that define the function of the site
The functional link between the Ramsar site and the Project comprises the two small tributaries of the River Hamble that would be crossed during construction. The interest features of the Ramsar site are dependent upon hydrological, geomorphological and marine processes (flooding of grazing marshes, tidal and fluvial dynamics etc.) that operate over an extremely large scale (the site itself has an area of 5,346.44ha). Any hydrological modifications to the watercourses as a result of the Project are considered likely to be localised, short duration, and reversible and so not likely to have a significant effect on the Ramsar site. As described above, embedded design and standard good practice measures would control the likelihood and impact of toxic and non-toxic contamination that could potentially result from Project construction and operation. As such, contamination events significant enough to interfere with functions of the Ramsar site are considered not likely to occur.
Significance as a result of the identification of effects set out above in terms of:
Disturbance to key species
No LSE are anticipated based on the information provided above.
Reduction of habitat areas
No LSE are anticipated based on the information provided above.
Habitat or species fragmentation
No LSE are anticipated based on the information provided above.
Fragmentation
No LSE are anticipated based on the information provided above.
Disruption

No LSE are anticipated based on the information provided above.
Disturbance
No LSE are anticipated based on the information provided above.
Changes to key elements of the site (e.g. water quality, hydrological regime etc.)
No LSE are anticipated based on the information provided above.
Of the above, elements of the Project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known
No LSE are anticipated based on the information provided above.
Outcome of screening stage
No LSE are anticipated based on the information provided above.

D.4 South West London Waterbodies SPA/Ramsar

Table A4.6.4: Screening matrix for South West London Waterbodies SPA (adapted from Highways Agency, 2009)

Characteristics of European site (JNCC, 2015; Natural England, 2014; Natural England, 2018)	
European site name / code	South West London Waterbodies SPA (UK9012171)
Location and distance of European site from the proposed works	The SPA comprises seven reservoirs and lakes, the closest of which is Staines Moor SSSI, approximately 420m west of the route
European site area	828.14ha
European site primary reasons for selection and other qualifying interests	This site qualifies under Article 4.2 of the Birds Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: Over winter: • Gadwall (*Anas strepera*), 786 individuals representing at least 2.6% of the wintering north western Europe population (5-year peak mean 1991/2 - 1995/6) • Shoveler (*Anas clypeata*), 1,075 individuals representing at least 2.7% of the wintering north western/Central Europe population (5-year peak mean 1991/2 - 1995/6)
Vulnerability of European site	• Disturbance – The SPA is set within an industrial, urban or suburban setting and there is noise and visual disturbance from a variety of sources. Pressure from recreational use of waterbodies is of particular concern, e.g. fishing, water sports.

	• Invasive non-native species – A variety of invasive non-native species are known from the SPA, e.g. zebra mussel (*Dreissena polymorpha*), quagga mussel (*D. rostriformis*) and New Zealand pigmyweed (*Crassula helmsii*). The spread of these or other aquatic plants and animals have the potential to alter biotic conditions for the qualifying features. • Natural processes – Waterbodies and marginal habitat are susceptible to natural succession without management, and the availability of food for qualifying species is dependent on the maintenance of appropriate water levels and quality which can vary naturally.
European site Conservation Objectives	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • the extent and distribution of the habitats of the qualifying features; • the structure and function of the habitats of the qualifying features; • the supporting processes on which the habitats of the qualifying features rely • the population of each of the qualifying features; and • the distribution of the qualifying features within the site. Supplementary advice for the Conservation Objectives of the SPA has been consulted as part of this assessment and is referred to where relevant.
Description of project	
Size and scale	A full description of all relevant project details is given in Section 2 of this report and Chapter 3 (Description of the Development) of the Scoping Report.
Distance from the European site or key features of the site	The route is approximately 650m to the east of Staines Moor SSSI, and passes near to lakes within the wider complex of waterbodies in the south west London area, known to be important in sustaining populations of the qualifying species of the SPA (Natural England, 2016): • The route is approximately 35m to the west of lakes along Littleton Lane (TQ 05971 67205 to TQ 06325 67962). • One potential alignment of the route passes along the bottom of the western embankment of the Queen Mary Reservoir, approximately 50m west of the reservoir (TQ 06065 69587 to TQ 06385 70326), and to the east of a small complex of lakes along Ashford Road immediately to the north west of the reservoir. • To the north of Ashford, one potential alignment of the route is located immediately west of the lakes comprising the former Princes Club Watersports Park (TQ 06598 72014 to TQ 06733 72603).

	The Littleton Lane waterbodies and Queen Mary Reservoir are designated as Important Bird Areas. See Figure A4.2. The route would also cross or is near to surface water bodies connected to waterbodies within the SPA or that are otherwise important to the SPA: • The route would cross the Laleham intake channel at approx. TQ 05376 69507, the main supply of the Queen Mary Reservoir. The method for crossing the channel has not yet been confirmed. • The route is adjacent to the River Ash between approx. TQ 06085 69577 and TQ 506285 70572, and crosses to the further north, upstream of the Staines Reservoirs Aqueduct, at TQ 05810 71293. The method for crossing the watercourse has not yet been confirmed. • The route would cross the Staines Reservoirs Aqueduct at approximately TQ 06280 70685 using trenchless techniques.
Land-take	No land-take from the SPA would be required as part of the Project.
Resource requirements (from the European site of from areas in proximity to the site)	The are no resource requirements from the SPA or supporting waterbodies required by the Project.
Emissions	The construction works for the Project would require plant and machinery that have the potential to generate dust and local emissions. The Project also has the potential to generate emissions (toxic and non-toxic) to surface water bodies connected to the SPA, either during construction or as a result of pipe leaks during operation. Toxic emissions could be generated during construction by spillages of fuels or leaking construction plant. Non-toxic emissions could be generated during construction by uncontrolled silting of waterbodies or the discharge of nutrient-enriched runoff as a result of the excavations. Toxic emissions could be generated during pipeline operation as a result of pipeline leaks.
Excavation requirements	No excavation works would take place within the SPA as part of the Project.
Transportation requirements	There are no traffic and transportation requirements relevant to the SPA as part of the Project. Traffic and transport would be confined to the Order Limits of the pipeline and to highways, and would comprise transport of plant, equipment, structures, materials and personnel.

Duration of construction, operation etc.	The Project is planned to commence main construction in March 2021, with construction lasting up to two years. Enabling works may commence before March 2021 at specific locations, for example vegetation removal, installation of fencing, or compound creation. The pipeline would be constructed in phases with the duration of each construction phase expected to last between one and two months, depending on local conditions. Further details of constructions timelines will be confirmed as the Project design and programme develops. The design life of the replacement pipeline is 60 years. Pipeline operation would be supported by monitoring of pipeline condition and maintenance. Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area. Esso operates robust procedures to manage the pipeline and prevent leakage.
Description of avoidance and/or mitigation measures	
Nature of proposals	There is no mitigation as part of the Project proposed specifically to address potential LSE to the SPA. However, the use of trenchless techniques under the above watercourses/channels (if practicable) and the adoption of suitable construction methods and good practice would further reduce the risk of effects to the SPA. Chapter 4 (Design Evolution) of the Scoping Report outlines this proposed embedded and good practice mitigation. Good practice measures would be secured by a CoCP and implemented and controlled by a CEMP. The CEMP would contain all relevant method statements. Construction would not commence until these documents had been submitted and approved by the competent authority or their statutory advisor.
Location	There is no mitigation as part of the Project proposed specifically to address potential LSE to the SPA. Construction good practice would operate across the route as a whole.
Evidence for effectiveness	Good practice guidelines are established and promoted by relevant environmental and construction institutions to ensure projects are delivered in compliance with required standards, policy and legislation. It is a standard approach to implement good practice guidelines during projects of this type, regardless of whether LSE are anticipated or not.
Mechanisms for delivery (legal conditions, restrictions or other legally enforceable obligations)	All good practice measures would be secured and delivered through a CoCP. Outline information is provided in Chapter 4 (Design Evolution) of the Scoping Report. A final version of the CoCP would be provided to support the Project's application for development consent. Construction good practice is achieved through regular site audits by appropriately experienced clerks of works (e.g. an ecologist).

Assessment criteria
Initial assessment
Disturbance to key species or habitats
Disturbance of qualifying species of the SPA For the duration of construction of the Project there would be changes to noise and visual stimuli generated by movement of plant and personnel within the construction area. During operation, such changes would be limited in frequency, duration and intensity, and would be restricted to routine or emergency inspection and/or maintenance of the pipeline. Anthropogenic noise and visual changes have well-documented disturbance effects on bird species, resulting in both behavioural and population changes (Latimer, et al., 2003). The potential impacts of noise and visual disturbance to qualifying species of the SPA as a result of the Project should therefore be considered. There is no current authoritative guidance on how far a noise study area should extend from construction activities due to the variability of the potential noise generating activities and plant used. However, the effects of noise (as well as visual/human presence) are only likely to be significant where the route extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting or breeding habitat that supports mobile animal species for which a European site is designated. Given the above, the Project is considered sufficiently distant from the SPA (420m) and Project activities relatively minor in the disturbance generated (e.g. there would be no major disturbance events, such as rock blasting or other controlled explosions, piling etc.) that noise disturbance is unlikely to have any effect on qualifying features within the SPA. Similarly, at such a distance visual disturbance to the SPA would not be expected to result from Project activities. Outside of the SPA, disturbance may result from the Project where the route is near to other areas that the qualifying species use during the winter. The south west London area supports a complex of waterbodies that are important for the maintenance of the qualifying species of the SPA, beyond those that are specifically included in the designation. The lakes along Littleton Lane, the Queen Mary Reservoir and the lakes to the west of the reservoir, and the lakes comprising the former Princes Club Watersports Park are recognised as forming part this wider complex. The former two are also designated as Important Bird Areas, and the qualifying features of the SPA are known to have used these waterbodies, albeit in small numbers (Briggs, 2007). As the timing of the works in this section of the route have yet to be confirmed, there is the potential for Project activities to cause noise or visual disturbance during the winter when the qualifying species might be present. *Littleton Lane Waterbodies* The route runs parallel to Littleton Lane, in verges or other land immediately to the west of the road (Figure A4.2). There are continuous rows of scrub and hedgerow either side of the length of Littleton Lane, screening the lakes to the east. In the southern half of the Lane, between the route and the lakes to the west (approximately 165m) there are industrial facilities, and to the north a large area of arable fields. The lake to the east of Littleton Lane is used by the Littleton Sailing Club (TQ 060 674), and there are residential areas adjacent to the lakes to the north east (Plates 1 and 2).

The above description demonstrates that there are existing noise and visual disturbance pressures to these lakes, including disturbance from the M3 motorway, recreation and industry. Although the current importance of these waterbodies to the SPA are unknown, given this context it is likely that if birds of the qualifying species do use these waterbodies during the winter then they are habituated to the existing levels of disturbance. Moreover, as there are many waterbodies in the surrounding south west London area, there is sufficient habitat for birds to move to during peak disturbance events at the Littleton Lane waterbodies (including undisturbed locations of the same waterbody).

Given the above, it is considered unlikely that any disturbance resulting from the Project would lead to a significant effect to the SPA. Moreover, as the pathway for noise and visual disturbance arising from Project activities is to some extent buffered by trees or built-up areas between Littleton Lane and the waterbodies as described above, then any increased noise or visual stimuli arising from the Project is considered likely to be mitigated by these existing buffers.

Queen Mary Reservoir and lakes to the west

The route presently comprises two potential routes near to Queen Mary Reservoir and a series of small waterbodies to its west (Figure A4.2). The closest route runs along the western embankment of the reservoir, between approximately TQ 06065 69587 and TQ 06385 70326, between the reservoir and the gravel pits to the west, partly through the existing gravel works. The other potential route is approximately 500m to the west, through a residential area. Only the first route is considered in this assessment as having the potential to affect the SPA.

The embankment of the Queen Mary reservoir is around 12m higher than the surrounding land (Engineering-Timelines, 2008), and there is dense scrub and woodland around the lakes to the west (Google Earth, 2018). The surrounding area is also highly disturbed, with an active gravel works, roads and residential areas. Given the small scale of the construction works required for the Project and existing levels of disturbance, the embankment and woody habitats are therefore considered likely to provide effective screens to any additional noise or visual stimuli arising from the Project that could affect qualifying species on the reservoir or lakes. Moreover, given the probability of habituation to noise and visual disturbance of any birds of the qualifying species using these waterbodies and the resource of alternative waterbodies in the south west London area, should any disturbance result from Project activities then it is considered unlikely to be significant to the SPA.

Former Princes Club Watersports Park

The route presently comprises two potential routes to the west of the waterbodies comprising the former Princes Club Watersports Park, north of Ashford (Figure A4.2). The closest route runs through playing fields of the school to the west of these waterbodies, between approximately TQ 06598 72014 and TQ 06733 72603, with the corridor located between 40 and 120m west of the waterbodies along this route. Between the route and the waterbodies to the east there is a continuous line of mature scrub and trees along the boundary between the playing fields and a former club house of the watersports park (Google Earth, 2018), which is considered to provide a screen for noise and visual disturbance effects arising from construction within the route and the waterbodies to the east.

Given the probability of habituation to noise and visual disturbance of any birds of the qualifying species using these waterbodies and the resource of alternative waterbodies in

the south west London area, should any disturbance result from Project activities then it is considered unlikely to be significant to the SPA.

Disturbance of supporting habitats of qualifying species of SPA due to spread of invasive non-native species

Changes to aquatic habitats supporting qualifying species of the SPA caused by invasive non-native species could occur if the Project activities were to come into contact with these and cause them to spread to nearby waterbodies via the watercourses identified, e.g. the Laleham intake for the Queen Mary Reservoir, should it be crossed by open cut trenching. This could cause changes in the structural properties of habitats on which the qualifying species depend, for example invertebrate communities.

The Project does not involve the transfer of water or materials into the SPA or its supporting waterbodies. The Project would involve temporary and localised excavations with all spoil being stored on site and reinstated on completion. It is considered extremely unlikely that construction or operation activities would introduce invasive non-native species to the SPA or its supporting waterbodies. Despite this, the risk of causing the spread of invasive non-native species would be further controlled by standard good practice methods. These would be outlined in the CoCP and delivered through a CEMP. These good practice measures would be implemented for all construction works associated with the Project and are not specific to watercourse crossings with pathways to the SPA.

As such, Significant effects to the SPA as a result of the spread invasive non-native species are not considered likely.

Reduction of habitat area

Physical loss of habitat supporting qualifying species of SPA

As the Project would not be within the SPA, any effect to qualifying species as a result of habitat loss could only likely result where construction would potentially damage or destroy suitable foraging, roosting or breeding habitat along the route.

The qualifying species of the SPA require areas of open water for foraging and roosting, and terrestrial habitat near to water such as short grassland or scrub for birds to rest up on. Habitats such as woodland may also act as screens from disturbance. The area around the waterbodies near to which the route would be constructed are generally urban or industrial, and no habitats of value to the qualifying features would be damaged or destroyed. It is therefore considered that there would be no effect to the SPA due to direct physical habitat loss resulting from the Project.

Loss of habitat supporting qualifying species of SPA due to toxic or non-toxic contamination

The SPA is beyond the 200m zone of influence within which emissions or fugitive dust from the Project construction are likely to have a significant impact on the habitats that support the qualifying species (Highways Agency, 2007; IAQM, 2014). Outside the SPA, given the relatively small scale of the works required, lack of terrestrial habitat and large scale availability of aquatic habitat suitable to the qualifying species, it is considered that any effects of degradation of habitat that might result from the Project due to temporary air quality changes are likely to be *de minimis* and not significant to the SPA. Moreover, independent of consideration of effects to the SPA, good practice measures would be implemented during construction in order to mitigate changes in air quality that could occur.

The Project also has very low potential to generate emissions (toxic and non-toxic) to ground- and surface water bodies, either as a result of construction activities (i.e. accidental spillages, silting etc.) or during operation (i.e. pipe leaks). As the route lies close to or crosses surface watercourses that are hydrologically connected to the wider network of waterbodies supporting populations of qualifying species of the SPA, there is a theoretical pathway for effects to occur to the SPA. As part of standard construction practice, contamination of ground- and surface water bodies would be controlled through standard good practice measures (e.g. following the guidance of DEFRA and EA, 2016), which would eliminate the risk of contamination of ground and surface water bodies. Such measures would be secured through a CoCP and delivered through a CEMP. The risk of operational contamination is also considered to be extremely low due to the design of the pipeline and monitoring that would occur throughout its operational lifetime. Indeed, Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area. Esso operates robust procedures to manage the pipeline and prevent leakage. Adherance to engineering good practice and professional standards of pipeline design and monitoring would mitigate the likelihood/impact of leaks during operation. The risk of toxic or non-toxic contamination of the SPA as a result of the project is therefore not considered likely.
Habitat or species fragmentation
The Project would not directly affect any habitats that are suitable for the qualifying features, either within or outside the SPA. As the qualifying species are highly mobile birds able to fly large distances in order to disperse and migrate, it is considered that the local scale of any effects associated with construction activity would not impair the qualifying species from moving about the landscape. As such, no fragmentation effects are predicted from the Project.
Reduction in species/habitat density
No reduction to qualifying species of the SPA would likely result from the Project through direct loss of individuals, as birds would readily be able to disperse if they were present within the route. As discussed above, no direct loss of supporting habitat of qualifying species and thus no reduction in habitat density is anticipated to result from the Project. Changes to the density of qualifying species due to the dispersal of birds resulting from disturbance is not considered likely to be significant, as described above.
Changes in key indicators of conservation value (water quality etc.)
The Conservation Objectives for the SPA cite the following as key attributes against which conservation success can be measured: the extent and distribution of supporting habitats of the qualifying species, including open water of appropriate depths for foraging, provision of aquatic vegetation for feeding and terrestrial habitats (within or outside the SPA boundary); the populations and distributions of qualifying species; the water quality and quantity required to maintain conditions suitable to the qualifying species; the concentrations of air pollutants; the frequency, duration and intensity of disturbance affecting the qualifying species. As described above, the Project would not result in significant direct changes to habitat suitable for the qualifying species, while indirect potential impacts resulting from changes

in air quality and emissions to ground- and surface waterbodies connected to the SPA that could destroy or damage habitats are unlikely to occur given the nature of the Project and by adopting standard good practice measures. It is therefore considered that the Project would not result in changes in key indicators of conservation value of the SPA.
Climate change
Activities associated with the Project would be of short duration and any changes to the landscape local and temporary. By appropriately controlling longer-term risks such as potential risks of contamination during construction and operation as described above, it is considered that the Project is unlikely to effect the SPA in combination with long-term habitat changes that might occur as a result of climate change.
Likely impacts on the European site as a whole in terms of
Interference with the key relationships that define the structure of the site
The key relationships that define the structure of the SPA comprise the population structure of the qualifying species, the structural properties of the habitats supporting the qualifying species and their interrelation at different scales. As described above, no significant changes to duck populations or supporting habitats are considered likely to result from the Project. It is therefore considered that no interference with key structural relationships of the SPA is likely to result from the Project.
Interference with the key relationships that define the function of the site
The key relationships that define the function of the SPA comprise its ability to support significant wintering numbers of the qualifying species, i.e. the requirements for roosting and foraging of the qualifying species, including the food chains which habitats support, and the relation of the SPA to the surrounding landscape enabling the qualifying species to migrate to the site during the winter. As described above, no significant changes to habitat are considered likely to result from the Project so that the ability of the SPA or the wider complex of waterbodies to support the qualifying features of the SPA would not be significantly impaired. Similarly, the Project would not lead to habitat fragmentation that would impair the ability of qualifying species to migrate.
Significance as a result of the identification of effects set out above in terms of:
Disturbance to key species
No LSE are anticipated based on the information provided above.
Reduction of habitat areas
No LSE are anticipated based on the information provided above.
Habitat or species fragmentation
No LSE are anticipated based on the information provided above.
Fragmentation
No LSE are anticipated based on the information provided above.
Disruption
No LSE are anticipated based on the information provided above.

Disturbance
No LSE are anticipated based on the information provided above.
Changes to key elements of the site (e.g. water quality, hydrological regime etc.)
No LSE are anticipated based on the information provided above.
Of the above, elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known
No LSE are anticipated based on the information provided above.
Outcome of screening stage
No LSE are anticipated based on the information provided above.

D.5 Thames Basin Heaths SPA

Table A4.6.5: Stage 1 screening matrix for Thames Basin Heaths SPA (adapted from Highways Agency, 2009)

Characteristics of European site	
European site name / code	Thames Basin Heaths SPA (UK9012141)
Location and distance of European site from the proposed works	The SPA comprises part or all of 12 SSSI. The route passes through or near to four of these sites, listed below (Figure A4.1). • Bourley and Long Valley SSSI – within the SPA between Ordnance Survey grid references SU 82310 52067 and SU 83305 53509 (the route passes through this site for approximately 1.7km). • Chobham Common SSSI – within the SPA between Ordnance Survey grid references SU 99014 64629 and SU 96914 63552 (the route passes through this site for approximately 2.4km). • Colony Bog and Bagshot Heath SSSI – within the SPA between Ordnance Survey grid references SU 93765 61655, SU 90778 60674 and SU 90941 58809 (the route passes through this site for approximately 5km). • Eelmoor Marsh SSSI – the Order Limits are located outside the site but the route passes along the site boundary between Ordnance Survey grid references TQ 83435 53674 and TQ 83691 53836 for approximately 350m.
European site area	8,274.72ha
European site primary reasons for selection and other qualifying interests	This site qualifies under Article 4.1 of the Birds Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: During the breeding season:

	• Dartford warbler (*Sylvia undata*), 445 pairs representing at least 27.8% of the breeding population in Great Britain (Count as at 1999) • Nightjar (*Caprimulgus europaeus*), 264 pairs representing at least 7.8% of the breeding population in Great Britain (Count mean (1998-99)) • Woodlark (*Lullula arborea*), 149 pairs representing at least 9.9% of the breeding population in Great Britain (Count as at 1997)
Vulnerability of European site	Key vulnerabilities comprise: • Air quality change – the structure and function of habitats which support the qualifying features are sensitive to changes in air quality (Natural England, 2016). • Disturbance caused by human activity – this is particularly significant because many parts of the SPA are in close proximity to urban areas. There is also high pressure from new residential development. The nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level that may substantially affect their behaviour, and consequently affect the long-term viability of the population. Such disturbing effects can, for example, result in changes to feeding or roosting behaviour, increases in energy expenditure due to increased flight, abandonment of nest sites, increased predation of eggs and chicks and desertion of supporting habitat (both within or outside the designated site boundary) (Natural England, 2016). • Changes to breeding habitat – conserving or restoring the extent of supporting habitats (including habitats required for breeding, foraging, roosting etc.) and their range is key to maintaining the ability and capacity of the SPA to support the qualifying features. The extent and distribution of supporting habitat used by the qualifying features will vary over time in relation to habitat management, succession and ad hoc events such as heath fires (Natural England, 2016). Appropriate site management is required to maintain optimum habitat characteristics for each of the qualifying features. • Predation – effects to breeding productivity can result directly from predation of eggs, chicks, juveniles and adults, and also indirectly as a result of significant disturbance. The presence of predators can influence bird behaviour, such as abandonment of nest sites or reduction of effective feeding (Natural England, 2016).
European site Conservation Objectives	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring: • the extent and distribution of the habitats of the qualifying features; • the structure and function of the habitats of the qualifying features;

	• the supporting processes on which the habitats of the qualifying features rely; • the population of each of the qualifying features; and • the distribution of the qualifying features within the site. Supplementary advice for the Conservation Objectives of the SPA has been consulted as part of this assessment and is referred to where relevant.
Description of project	
Size and scale	A full description of all relevant project details is given in Section 2 of this document and Chapter 3 (Description of the Development) of the Scoping Report.
Distance from the European site or key features of the site	The route is located within or adjacent to four SSSI within the SPA: • Bourley and Long Valley SSSI – Within the SPA between SU 82310 52067 an SU 83305 53509 (approximately 1.7km), although the exact pipeline alignment has yet to be exactly determined. See Figure A4.3 for the route within the site. • Colony Bog and Bagshot Heath SSSI – Within the SPA between SU 93765 61655, SU 90778 60674 and SU 90941 58809 (approximately 4.1km), although the pipeline alignment has yet to be exactly determined. See Figure A4.5 for the route and priority habitats. • Chobham Common SSSI – Within the SPA between SU 99014 64629 and SU 96914 63552 (approximately 2.4km), although the pipeline alignment has yet to be exactly determined. The existing pipeline also runs within and adjacent to a well-established track between these points. See Figure A4.4. • Eelmoor Marsh SSSI – The route is located outside the site but is located immediately adjacent to its boundary between SU 83435 53674 and SU 83691 53836, along Old Ively Road. See Figure A4.6 for the route within the site. The route is also located within the following SANGS sites (see Figure A4.7): • Crookham Park (Queen Elizabeth Barracks) SANGS. • Southwood Golf Course proposed SANGS. • Chertsey Meads SANGS. SANGS sites are areas of strategic green space identified, maintained and/or created by local authorities in order to relieve recreational pressure on the SPA (Thames Basin Heaths Partnership, 2018).
Land-take	The final route of the pipeline through the SPA is yet to be confirmed and so approximate land-take measurements are currently unknown. However, temporary land-take within the SPA would be reduced as much as possible during the construction phase.

	The route and provisional compound locations within the SPA are shown in Figures A4.3 to A4.6. Within the SPA, the Order Limits are currently wider than that required to construct the pipeline to enable greater flexibility for pipeline design. The proposed construction working areas would likely be much narrower, although this would be confirmed as the design develops. Following completion of construction works, all areas of land used within the SPA would be restored or enhanced to improve their nature conservation value (e.g. conversion of pine plantation woodland to heathland), in agreement with Natural England (and other key stakeholders, where relevant).
Resource requirements (from the European site of from areas in proximity to the site)	Construction of the pipeline within the Order Limits would require excavations and clearance of vegetation within the SPA. Excavations would be required to install the pipeline, most likely by open cut trenching (localised trenchless techniques may be required, such as at major road crossings or at the Basingstoke Canal SSSI). Vegetation clearance would be required in advance of topsoil stripping (where these areas were vegetated), and elsewhere within the working corridor to facilitate the movement of construction plant etc. and to exclude wildlife from the working area (e.g. reptiles and amphibians). The pipeline excavation and installation would likely generate spoil that could not be accommodated once the pipeline were in the ground. Woody material and spoil could be used to create habitat piles if agreed with Natural England and landowners. Any surplus material would be removed from site.
Emissions	The construction work for the Project would require plant and machinery that have the potential to generate dust and local emissions. The Project also has the potential to generate emissions (toxic and non-toxic) to ground- and surface water bodies within or connected to the SPA. Toxic emissions could be generated during construction by spillages of fuels or leaking construction plant. Non-toxic emissions could be generated during construction by uncontrolled silting of waterbodies, the discharge of nutrient-enriched runoff as a result of the excavations. Toxic emissions could be generated during pipeline operation as a result of pipeline leaks.
Excavation requirements	<u>General excavation/pipeline installation specifications</u> See Chapter 3 of the Scoping Report (Description of the Development) for more detailed information relating to excavations. Along the chosen route the pipeline would be constructed through a combination of open cut trenching and trenchless techniques. Open cut trenching would involve the cutting of a trench to a depth of approximately 1.5m and width of approximately 0.6m, although this may vary based on ground conditions.

	Trenchless techniques would likely require a pit or shaft at each end of the pipeline section. The excavation works would be designed according to local conditions. The requirements for separate stripping, excavation, handling and storage of topsoil and subsoils would depend on local conditions and would follow good practice guidance, as outlined in Chapter 4 (Design Evolution) of the Scoping Report. <u>Excavations within the SPA</u> Although not yet confirmed, the Project is likely to have the following excavation requirements within the SPA: • Bourley and Long Valley SSSI – Currently it is intended that the route would be constructed in an open cut trench. The pipeline would be constructed under the Aldershot Road and Basingstoke Canal by trenchless techniques between approximately SU 82724 52708 and SU 82746 52802, with associated construction sites either side of the road within the SPA. • Chobham Common SSSI – The Order Limits comprise a broad area into which the pipeline could be installed, although it is currently preferred that the pipeline would be installed within or adjacent to a well-established and built-up track. This would follow the alignment of the existing pipeline. It is anticipated that open cut trenching would be utilised. • Colony Bog and Bagshot Heath SSSI – The length of pipeline along the western edge of the SSSI would likely be constructed by open cut trenching within or adjacent to an existing broad, straight and well-established track along this route. Similarly, the pipeline in the north west and north east of the site would likely be constructed by open cut trenching within existing straight tracks across the site. The pipeline would avoid an area of valley mire (Folly Bog) between approximately SU 92734 61265 and SU 91782 60933 by adopting an alignment within the existing track or through an area of heathland/secondary woodland. • Eelmoor Marsh SSSI – There would be no excavation requirements within this site. • It is anticipated that construction in the three SANGS sites would be achieved by open cut trenching. The exact route and design of the installation along the above routes have yet to be confirmed. However, the tracks within the SPA would in places not be wide enough to accommodate the full working requirements for the pipeline installation. Construction activity would likely be required in adjacent areas of habitat off the track. There may be a requirement for topsoil stripping along haul routes. Any operations outside of the track would be supported by appropriate good practice mitigation to mitigate effects to soils and habitats, such as ground protection or ecological supervision. This would be confirmed and described in detail as the Project's design develops.

	The design of the construction working corridor, and thus the requirements for topsoil stripping and other movements of soil, would be modified in areas of particularly sensitive habitat, including water-dependent habitat such as wet heath. In such areas trenchless techniques or confined-width working methods may be adopted to reduce the excavation requirements. These measures would be described, secured and delivered by the CoCP.
Transportation requirements	There would be traffic and transport associated with the Project during the construction phase, when construction plant would be transported to and from the SPA. The precise transportation requirements within the SPA are not currently known. Indicative conservative estimates for traffic calculations for rural and urban sections of the route (outside the SPA) are provided in Appendix 8.2 of the Scoping Report. There would be plant tracking within the SPA. Based on the section of the route between Boorley Green to Bramdean (considered to be a conservative estimate for a rural area) the construction plant and machinery are anticipated to consist of a mixture of the following types where open cut-trenching is adopted: • tracked machines, such as excavators, typically less than four; • dumper trucks (5-6 tonne); and • trench rollers. Further traffic and transportation may be required for maintenance or repair works during operation of the pipeline although this would be minimal and very infrequent.
Duration of construction, operation etc.	The Project is planned to commence main construction in March 2021, with construction lasting up to two years. Enabling works may commence before March 2021 at specific locations, for example vegetation removal, installation of fencing, or compound creation. The pipeline would be constructed in phases with the duration of each construction phase expected to be around one to two months, depending on local conditions. The Project would be constructed within or adjacent to the SPA between 1st October and 31st January inclusive, i.e. outside of the bird breeding season. Further details of the constructions timelines will be confirmed as the Project design and programme develops. The design life of the replacement pipeline is 60 years. Pipeline operation would be supported by monitoring of pipeline condition and maintenance. Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area. Esso operates robust procedures to manage the pipeline and prevent leakage.
Description of avoidance and/or mitigation measures	

Nature of proposals	<u>Timing</u> All main construction activity within the SPA would be programmed for the period 1st October to 31st January to avoid the breeding season and to take advantage of the periods when less significant numbers of the qualifying species would be present. This timing takes into account the supplementary advice for the conservation objective of the SPA (Natural England, 2016). The trapping and translocation of reptiles and great crested newts (GCN) within the SPA may be necessary, depending on the results of surveys to be undertaken in 2018. Any such activity would likely be undertaken from 1st August, after the end of the bird breeding season but before the start of the reptile and amphibian hibernation season in October and November. If required, trapping and translocation works would involve the installation of a temporary herpetofauna fence around the boundary of the construction footprint. Reptiles and GCN would be removed from the trapping area on a daily basis for an anticipated maximum period of 60 days (although trapping may cease after 30 days, depending on survey results and/or European Protected Species Mitigation licence conditions). These activities are considered to be low impact and would not result in significant damage to habitat or disturbance to birds. <u>Construction methods</u> The exact design of the pipeline installation along the route has yet to be confirmed. The optimum working width required for the pipeline is 30m; this is influenced by health and safety guidelines, machinery size, and storage areas. Within the SPA, embedded mitigation would ensure that the construction working width would be reduced from 30m to reduce impacts to the site. Where possible, the pipeline construction areas would align with existing access tracks. However, most tracks would not be wide enough to accommodate the full working requirements for the pipeline installation, and so construction activity in adjacent areas of heathland habitat is likely. Appropriate ground protection measures would be implemented, as required. Site compounds would also be required to be sited within the SPA. The location of these would be chosen so as to reduce adverse effects to the qualifying features. <u>Good practice</u> The draft CoCP would incorporate agreed industry good practice standards that the contractor would be required to implement during construction, and would form the basis of the contractor's CEMP. Typical good practice standards to be incorporated into the CoCP are outlined in Chapter 4 (Design Evolution) of the Scoping Report and include measures to prevent and control pollution incidents, avoid or reduceair quality changes (e.g. dust), and avoid or reduce disturbance caused by noise or lighting.

	Good practice mitigation measures would be adhered to throughout the construction period and across the whole length of the Project, independent of consideration of effects to the SPA. <u>Habitat restoration</u> The pipeline would be entirely below ground and so there would be no permanent loss of habitat in this area. Any vegetation cleared or otherwise damaged in order to construct the pipeline along the route through the SPA would be restored to its former type and condition. Where possible, the alignment of the pipeline within the SPA would be positioned within tracks in order to reduce effects to heathland habitats and therefore the need for restoration. It is currently anticipated that reinstatement of the working area within the SPA would be achieved using natural regeneration from the reinstated topsoil (or subsoil, should it be preferred by key stakeholders that topsoil reinstatement is not desirable). If required, reseeding using seed and material sourced from adjacent habitat within the SPA could also be adopted. These approaches would be refined and agreed with Natural England and other key stakeholders, as the design of the Project develops. Full plans and work methods for habitat restoration and subsequent management and monitoring would be set out in the CoCP and CEMP. <u>Habitat enhancement</u> Opportunities for enhancement of habitat would be explored in order that the Project provides a net gain for biodiversity. This might include the clearance of areas of secondary birch (*Betula*) or pine (*Pinus*) woodland and restoration to heathland so as to benefit the qualifying features. Opportunities for habitat enhancement would be identified and agreed upon with Natural England and other relevant stakeholders. Full plans and work methods for habitat enhancement and subsequent management and monitoring would be set out in the CoCP and/or CEMP.
Location	All works within the SPA and SANGS would be subject to the relevant embedded mitigation and good practice measures outlined above and in Chapter 4 (Design Evolution) of the Scoping Report. Location-specific mitigation or additional mitigation would be refined and detailed as the design of the Project develops and following consultation with Natural England and other key stakeholders.
Evidence for effectiveness	<u>Timing</u> The SPA is designated for its breeding populations of nightjar, woodlark and Dartford warbler. Programming potentially disturbing activities to avoid the breeding season is a well-established and effective strategy to avoid effects to breeding birds. Disturbance to breeding birds would not arise if construction activities were to avoid the breeding period. Similar working arrangements have been

	agreed with Natural England for planning applications for works within the SPA (e.g. South East Water project at Swinley Forest). Works undertaken during the winter are less likely to generate significant amounts of dust as the ground and atmospheric conditions are typically damp. As such, possible effects to heathland vegetation would be reduced when compared to construction works undertaken during the summer. <u>Minimising the working area</u> Minimising the construction area of the Project would reduce the area of the SPA and its habitat that would be directly affected. Minimising the area of effects is a well-established and effective mitigation technique, and follows the preferred initial approach to mitigation set out in the 'biodiversity mitigation hierarchy' in national planning policy (Ministry of Planning, Housing and Local Government, 2012). <u>Construction good practice</u> Good practice guidelines are established and promoted by relevant environmental and construction institutions to ensure projects are delivered in compliance with required standards, policy and legislation. It is a standard approach for construction projects to implement good practice guidelines. <u>Habitat restoration and enhancement</u> The SPA's Conservation Objectives seek to maintain or restore heathland vegetation that is typically short or medium in height, with bare patches, and scattered low trees and scrub suitable for the qualifying species (Natural England, 2016). The objective of habitat restoration and enhancement described above for the Project is therefore in line with the Conservation Objectives for the SPA and would provide a benefit to the site. Dry heathland establishes readily in areas of cleared ground, with key plant species generated from buried seed and dispersal from adjacent heathland habitat. It is a standard conservation practice on heathlands to periodically scrape, cut or otherwise disturb areas of late successional vegetation, such as overgrown heathland vegetation or secondary woodland or scrub, in order to promote the regeneration of heathland habitat (e.g. Symes and Day, 2003). A recent pipeline project through the SPA that undertook post-construction heathland enhancements following clearance of plantation woodland found rapid establishment of dry heathland within two years, and has been commended by Natural England (South East Water, 2018). Post-construction restoration and enhancement works would emulate the above practices. Areas of heathland, scrub or woodland cleared within the Order Limits for the Project are therefore likely to successfully regenerate to heathland habitat following construction, and therefore avoid any medium- or long-term impacts on the SPA.

Mechanisms for delivery (legal conditions, restrictions or other legally enforceable obligations)	All good practice measures would be secured and delivered through a CoCP and/or CEMP. Outline information is provided in Chapter 4 (Design Evolution) of the Scoping Report. A final version of the CoCP would be provided to support the Project's application for development consent. Methods for securing the delivery of this obligation are set out below. Timing The proposed programme would be agreed with PINS and Natural England and secured and delivered through a CEMP. The contractor would plan and resource for all works within the SPA to be completed between 1st October and 31st January. No main construction works would be undertaken between February and September without prior approval from the competent authority. However, the trapping and translocation of GCN and reptiles would be undertaken between 1st August and the start of the hibernation period in October/November, as necessary. Minimising the working area The proposed working area would be agreed and defined by the Project's Order Limits. The agreed working area would be plotted on engineering drawings using CAD/GIS referencing and then demarcated on site using appropriate fencing. The position of the demarcation fencing would be approved by an ECoW before construction commenced. The fence would be regularly inspected and maintained by the contractor and ECoW throughout the duration of construction activity. No construction activity would encroach into areas beyond the demarcation fence. Construction good practice Construction good practice would be achieved through regular site audits and supervision by the ECoW, and the provision of toolbox talks. Habitat restoration and enhancement Full plans and work methods for habitat restoration and enhancement and subsequent management and monitoring would be set out in the CoCP, CEMP and/or other appropriate management plans. All habitat restoration and enhancement works would be undertaken by an appropriately experienced contractor.
Assessment criteria	
Initial assessment	
Disturbance to key species or habitats	
Disturbance to qualifying species of the SPA For the duration of construction of the Project there would be changes to noise and visual stimuli generated by movement of plant and personnel within the construction area, excavation and other groundworks, and transport. During operation, such changes would be extremely limited in frequency, duration and intensity, being confined to routine or emergency inspections and maintenance of the pipeline.	

Anthropogenic noise and visual changes have well-documented disturbance effects on bird species, resulting in both behavioural and population changes (e.g. Latimer *et al*, 2003). The potential impacts of noise and visual disturbance to qualifying species of the SPA as a result of the Project should therefore be considered.

There is no current authoritative guidance on how far a noise study area should extend from construction activities due to the variability of the potential noise generating activities and plant used. However, the effects of noise (as well as visual/human presence) are only likely to be significant where the boundary of the Project extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting or breeding habitat that supports mobile animal species for which a European site is designated. As the Project would take place within the SPA and within habitat outside the SPA that could supporting SPA populations of the qualifying species (e.g. non-SPA areas of scrub, heathland and forestry), the Project therefore has the potential to impact SPA populations of the qualifying species.

A desk-study of breeding sites of qualifying species between 2007-2017 (Appendix C) shows that the route passes through areas of the SPA that have consistently supported breeding sites for the qualifying species of the site. Within Bourley and Long Valley SSSI, the desk study indicates that the area through which the route passes has only occasionally supported breeding territories of the qualifying species and in very low numbers. Within Colony Bog and Bagshot Heath SSSI, breeding territories of only Dartford warbler have been recorded consistently along the route, with no records of nightjar and woodlark recorded in the last five years and then only in one location, approximately 90m from the route. Within Chobham Common SSSI, breeding territories of all three qualifying species have been recorded consistently and in numbers along the route. Within Eelmoor Marsh SSSI, small numbers of breeding territories of all three species (up to four, for Dartford Warbler in 2017) have been recorded consistently within the former Cove radio station area to the south of the route. Other areas of the SSSI have not been found to support the species or were not surveyed.

There is limited information available relating to the thresholds at which the qualifying features of the SPA would start to exhibit behaviour associated with noise or visual disturbance. However, the proposed works would be temporary and would not involve activities likely to generate continuous or regular loud noise events (e.g. pile driving, blasting etc.), that are more typically associated with causing disturbance to birds (Latimer *et al*, 2003). As construction would take place largely along tracks open to the public there would already be a level of disturbance along the route. Moreover, by programming works for the Project within the SPA for completion between 1st October and 31st January, any disturbance caused to qualifying species present during this time (i.e. Dartford warbler or woodlark) would not result in LSE as breeding success would not likely be affected at this time of year, and the birds would be able to relocate to undisturbed parts of the SPA within the immediate vicinity. Any effect of disturbance during this period are therefore considered to be *de minimis*.

The desk-study also confirms that there have been no records of qualifying species nesting within SANGS sites or elsewhere along the route. Moreover, the habitat outside of the SPA is generally suboptimal, with likely only very small pockets of relict heathland within plantation forestry and amenity areas. While works outside of the SPA may occur during the breeding season, any effects resulting from the Project due to disturbance of SPA populations of the qualifying species breeding outside of the site are therefore likely to be *de minimis*.

Disturbance as a result of increased recreational activity within the SPA

As construction works would take place within three SANGS sites there is a potential for Project activities to discourage people from using these sites during the works period. Consequently, some recreational activity might be displaced to the SPA, resulting in increased noise and visual disturbance of qualifying species of the SPA, trampling of nests and physical disturbance of supporting habitat. If this displacement were to take place during the breeding season, then this could result in effects to the SPA. It has yet to be confirmed whether or not works within SANGS would take place during the breeding season.

It is not possible to estimate the numbers of people that could be displaced as a result of construction of the Project within SANGS. However, given the limited extent of the route within SANGS sites and the likely short duration of works in these areas (it is expected that approximately 450m of pipe would be laid in rural areas, such as SANGS, per week), then it is unlikely that numbers of people displaced and the resulting disturbance would be significant to the SPA as a whole.

Disturbance to supporting habitats of qualifying species of the SPA as a result of the spread of invasive non-native species

The SPA is vulnerable to the spread of a number of invasive non-native plant species, e.g. rhododendron (*Rhododendron ponticum*) which is present within the SPA. The spread of such species could negatively alter habitat structure making habitat unsuitable to the qualifying species of the SPA. Ground disturbance caused by construction activities as part of the Project could spread invasive species into new areas of the SPA. However, this would be controlled by standard good practice measures which would operate across the project independent of consideration of effects to the SPA, as outlined in Chapter 4 (Design Evolution) of the Scoping Report. This would be secured through a CoCP that would be provided to support the Project's application for development consent.

Furthermore, the area of habitat likely to be affected by construction activity would be very small when compared to the total area of the SPA. In the unlikely event that invasive non-native plants were introduced to new areas, there is considered to be negligible potential for this to result in LSE.

Reduction of habitat area

Physical loss of habitat supporting qualifying species of SPA

The route would affect habitat within the SPA. While it is intended to restrict as much construction activity as possible to existing tracks, it is anticipated that habitat adjacent to the track would be temporarily removed to allow for additional working areas, where these could not be accommodated within tracks. The precise area of habitat that would be affected is not yet known and will be confirmed as the Project design develops.

The total area of the SPA is 8,274.7ha. At present, the total area of habitat within the Order Limits is approximately 60ha and accounts for approximately 0.7% of the SPA's total area. It is not anticipated that the entire Order Limits area would be given over to construction activity, especially at Chobham Common where a very wide Order Limits has been proposed to allow greater flexibility to find an optimum pipeline alignment. Even in a hypothetical scenario during which the total 60ha area of SPA within the Order Limits was temporarily destroyed during construction, it is not anticipated that LSE would arise given the small area (0.7%) of the total SPA resource that would be affected.

All area of habitat loss would be temporary, to be restored on completion of the works. Regeneration to acid grassland and pioneer heathland is anticipated to take approximately two growing seasons (South East Water, 2018).

The qualifying species of the SPA could potentially use any of the heathland habitats to be affected by the works, either for breeding, roosting or foraging. More open habitats of low sub-shrubs with scattered scrub and trees comprise the main breeding habitats of Dartford warbler, woodlark and nightjar. The results of the desk study of breeding sites of the qualifying species within the SPA (Appendix C) confirm that the species use or have used in the recent past a much larger area than that which would be affected by the Project. This would indicate that there is ample available habitat elsewhere in the SPA for qualifying species to relocate to while restored habitat develops. Areas of bare earth are suitable for nesting nightjar (Berry, 1979) and woodlark (Sitters, et al., 1996), so that habitat disturbed by the Project would not be completely unsuitable for the qualifying species during the regeneration period.

In summary, the loss of habitat suitable for the qualifying species of the SPA is of small scale and temporary. Any effects to the SPA via the pathway of habitat loss are therefore considered to be *de minimis*.

<u>Loss of habitat supporting qualifying species of SPA due to toxic or non-toxic contamination</u>

The Project has the potential to generate emissions (toxic and non-toxic) to ground- and surface water bodies, either as a result of construction activities (accidental spillages, silting etc.) or as a result of pipe leaks during operation, which could damage supporting habitats of the qualifying species of the SPA.

Contamination of ground- and surface water bodies would be controlled during construction by good practice measures (e.g. following the guidance of DEFRA and EA, 2016), as outlined in Chapter 4 (Design Evolution) of the Scoping Report. This would be secured through the CoCP which would be provided to support the Project's application for development consent.

The risk of operational contamination is also considered to be extremely low due to the design of the pipeline and monitoring that would occur throughout its operational lifetime. Indeed, Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area, and Esso operates robust procedures to manage the pipeline and prevent leakage.

Adherance to engineering good practice and professional standards of pipeline design and monitoring would mitigate the likelihood/impact of leaks during operation. Given these measures, the risk of toxic or non-toxic contamination of the SPA as a result of the Project is not considered likely.

<u>Loss of habitat supporting qualifying species of SPA due to air quality changes</u>

Appendix 8.1 of the Scoping Report provides detailed information relating to air quality.

The supporting habitats of the qualifying species of the SPA, i.e. heathland, are sensitive to changes in air quality resulting from pollution, including the generation of dust and combustion exhaust gases (such as NO_x compounds and SO_2).

Construction activities for the Project have the potential to generate effects associated with dust deposition within 50m of its boundary (IAQM, 2014). Excessive dust deposition can significantly change the nature of the supporting habitat for the qualifying features (Natural England, 2016). However, all construction activity would comply with relevant good practice guidelines (e.g. those recommended by IAQM (2014)). Main construction

works within the SPA would be restricted to the period between 1st October and 31st January, during which period activities would be less likely to generate significant amounts of dust as the ground and atmospheric conditions are typically damp. As such, possible effects to heathland vegetation would be reduced when compared to construction works undertaken during the summer. Furthermore, the proposed works are temporary and of short duration, and together with good practice any effects of dust are considered likely to be *de minimis*.

Construction activities for the Project have the potential to generate effects resulting from air pollution associated with combustion exhaust gases arising from construction activities, leading to the deposition of nitrogen and acidifying pollutants that can adversely affect the composition and structure of vegetation. The SPA is already in exceedance of minimum and maximum critical loads for nitrogen deposition (maximum critical load: 15 kg N/ha/yr; current deposition: 21.7-26.5kg N/ha/yr) and in exceedance of the minimum critical load for acid deposition (Air Pollution Information System, 2017). Eelmoor Marsh SSSI would likely be buffered from additional deposition resulting from construction activities along Old Ively Road due to the screen of dense scrub and trees between Old Ively Road and the site for the majority of this part of the route corridor (Google Earth, 2018). The deposition of pollutants may therefore have an effect at the other SPA sites through which the route passes.

IAQM guidance (2014) specifies that '*experience with assessing the exhaust emissions from on-site plant and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed*'. Effects of construction activities resulting from air quality are therefore likely to be *de minimis*. Moreover, construction works would be of short duration and relatively low intensity, with relatively low numbers and sizes of plant and machinery items anticipated to operate for the construction of the pipeline simultaneously. As the most significant negative effects of nitrogen and acid deposition likely to affect the qualifying species of the SPA, such as degeneration of cover by subshrubs and increase in grass cover, develop with long-term deposition (Stevens, et al., 2011), the short term nature of deposition arising from Project activities would also indicate that any effects are likely to be *de minimis*.

Habitat or species fragmentation

The pipeline would be entirely below ground and once construction works had ceased all areas of habitat effected would be restored or enhanced. As such, there would be only temporary disruption in habitat connectivity/structure as a result of the Project. Moreover, as a proportion of the construction working corridor would comprise existing tracks (e.g. around 3-5m wide at Chobham Common) there is an existing effect of habitat fragmentation. As the qualifying species of the SPA are highly mobile species the effect of a temporary and relatively small increase in the width of this fragmentation is considered not likely to have any significant effect to the qualifying species.

Reduction in species/habitat density

The Project may result in changes to the density and number of potential nest sites during the period when heathland habitat is regenerating following construction. There may therefore be changes in species density if birds would be displaced from the immediate vicinity of the Order Limits.

However, the total area of the SPA is 8,274.7ha. The total area of habitat within the Order Limits (not all of which would be affected) is approximately 60ha and accounts for

approximately 0.7% of the SPA's total area. Given these areas, the Project would be unlikely to significantly reduce the density of the qualifying species or supporting habitat in context of the entire SPA.
Changes in key indicators of conservation value (water quality etc.)
The Conservation Objectives of the SPA cite the following as key attributes against which conservation success can be measured: air quality; population abundance; extent and distribution of supporting habitat for the breeding season; vegetation characteristics; disturbance caused by human activity; landscape; predation; food availability; and connectivity with supporting habitats. As described above, it is not anticipated that the Project would result in significant changes to the following: air quality; population abundance; extent and distribution of supporting habitat for the breeding season; vegetation characteristics; or connectivity with supporting habitats. Disturbance caused by human activity is discussed above and would not result in LSE owing to the proposed timing of construction within the SPA. Due to the temporary nature of the works and as the pipeline would be constructed entirely below ground, the Project would not affect the landscape characteristics of the SPA. The Project would not introduce or encourage predators into the SPA; nor would it increase the susceptibility of the qualifying features to existing predation. Finally, due to the mobility of the qualifying features and the large area of unaffected foraging resource compared with the small area of habitat affected, the Project would not affect food availability of the qualifying features.
Climate change
Activities associated with the Project would be of short duration and any changes to the landscape local and temporary. By appropriately managing longer-term risks caused by contamination during construction and operation of the Project as described above, it is considered that the Project is unlikely to effect the SPA in combination with long-term landscape changes that might occur as a result of climate change.
Likely impacts on the European site as a whole in terms of
Interference with the key relationships that define the structure of the site
The key relationships that define the structure of the SPA comprise the structural properties of the supporting habitats of the qualifying species (e.g. vegetation structure and supported invertebrate communities), and structural linkages between habitats (including linkages between individual sites within the SPA). As described above, the SPA is 8,274ha compared to the Order Limits area of approximately 60ha (0.7% of the total SPA area). No significant effects are considered likely to arise due to loss of habitat or habitat fragmentation. Therefore, given the localised and temporary nature of effects arising from the Project, no significant effects to the structure of the SPA as a whole are anticipated.
Interference with the key relationships that define the function of the site
The key relationships that define the function of the SPA comprise the functions that maintain habitat supporting the qualifying species (e.g. soil and hydrological processes) and management. As described above, the SPA is 8,274ha compared to the Order Limits

area of approximately 60ha (0.7% of the total SPA area). No significant effects are considered likely to arise due to loss of habitat. Therefore, given the localised and temporary nature of effects arising from the Project, no significant effects to the function of the SPA as a whole are anticipated.
Significance as a result of the identification of effects set out above in terms of:
Disturbance to qualifying species
No LSE are anticipated based on the embedded mitigation proposed. However, the *People Over Wind and Sweetman* ruling indicates that mitigation specifically required to avoid LSE should not be considered at Stage 1 Screening. As such, the effects of disturbance may need to be assessed at Stage 2 Appropriate Assessment. Further guidance from Natural England is required to determine this.
Reduction of habitat areas
No LSE are anticipated based on the objective information provided above.
Habitat or species fragmentation
No LSE are anticipated based on the objective information provided above.
Fragmentation
No LSE are anticipated based on the objective information provided above.
Disruption
No LSE are anticipated based on the objective information provided above.
Disturbance
No LSE are anticipated based on the objective information provided above.
Changes to key elements of the site (e.g. water quality, hydrological regime etc.)
No LSE are anticipated based on the objective information provided above.
Of the above, elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known
No combinations of elements of the Project are anticipated to result in LSE based on the objective information provided above.
Outcome of screening stage
No LSE are anticipated based on the objective information provided above although the *People Over Wind and Sweetman* ruling may mean that the effects of disturbance to the SPA should be considered at Stage 2 Appropriate Assessment. Further advice from Natural England will be required to confirm this.

D.6 Thursley, Ash, Pirbright and Chobham SAC

Table A4.6.6: Stage 1 screening matrix for Thursley, Ash, Pirbright and Chobham SAC (adapted from Highways Agency, 2009)

Characteristics of European sites	
European site name / code	Thursley, Ash, Pirbright and Chobham SAC / UK0012793
Location and distance of European site from the proposed works	The SAC comprises four SSSI. The route passes through two of these sites: • Chobham Common SSSI – within the SPA between Ordnance Survey grid references SU 99014 64629 and SU 96914 63552 (the route crosses approximately 2.4km of this site) • Colony Bog and Bagshot Heath SSSI – within the SPA between Ordnance Survey grid references SU 93765 61655, SU 90778 60674 and SU 90941 58809 (the route crosses approximately 5km of this site)
European site area	5,154.4ha
European site primary reasons for selection and other qualifying interests	Annex I habitats that are a primary reason for selection of this site: • 4010 North Atlantic wet heaths with *Erica tetralix* (515.45ha) • 4030 European dry heaths (3,608.15ha) • 7150 Depressions on peat substrates of the *Rhynchosporion* (5.15ha)
Vulnerability of European site	• Air pollution – Qualifying features are considered sensitive to changes in air quality, particularly nitrogen and acid deposition. Exceedance of critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it. • Grazing – Qualifying features are sensitive to excessive grazing, reducing the cover of key plant species. • Human disturbance – Trampling and other disturbance by humans can damage qualifying features. This is particularly significant because many parts of the SAC are in close proximity to urban areas. • Hydraulic changes – Qualifying features are water-dependent and changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present, including habitat degradation and invasion by non-native species. Defining and maintaining the appropriate hydrological regime is key to achieving the Conservation Objectives for this site.

	• Succession – Undesirable exotic or native non-woody and woody vascular plants species may require active management to avert an unwanted succession to less desirable habitats.
European site Conservation Objectives	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring: • the extent and distribution of qualifying natural habitats; • the structure and function (including typical species) of qualifying natural habitats; and • the supporting processes on which qualifying natural habitats rely. Supplementary advice for the Conservation Objectives of the SAC has been consulted as part of this assessment and is referred to where relevant.
Description of project	
Size and scale	A description of all relevant project details is given in Section 2 of this report and Chapter 3 (Description of the Development) of the Scoping Report.
Distance from the European site of key features of the site	The route is located within or adjacent to two SSSI within the SAC: • Chobham Common SSSI – Within the SPA between SU 99014 64629 and SU 96914 63552 (approximately 2.4km). The existing pipeline also runs within and adjacent to a well-established track between these points, although the precise route has yet to be determined. See Figure A4.4 for the route within site and priority habitats. • Colony Bog and Bagshot Heath SSSI – Within the SAC between SU 93765 61655, SU 90778 60674 and SU 90941 58809 (approximately 5km), although the route has yet to be exactly determined. The majority of the northern part of the route is within the area managed by the Surrey Wildlife Trust as Brentmoor Heath (including Folly Bog) Nature Reserve. Folly Bog is an area of valley mire at approximately SU 612 924, under which the existing pipeline passes. See Figure A4.5 for the route and priority habitats at this location.
Land-take	The final route of the pipeline through the SAC and the width of the associated working areas are yet to be confirmed. The area of land within the Order Limits is approximately 44ha at Chobham Common SSSI and 10.5ha at Colony Bog and Bagshot Heaths SSSI. However, the above areas do not comprise actual land-take for the Project but broad corridors in which the pipeline would be constructed, and which will be refined to a more definite route as the design of the pipeline evolves. It is anticipated that the construction corridor would be restricted to the minimum width possible, with some of this being located above existing tracks. Alternatively, construction may be achievable by

	trenchless techniques. Further details relating to construction techniques will be confirmed as the design evolves and following ground investigation works. Following completion of construction works, all areas of land used within the SAC would be restored or enhanced to improve their nature conservation value (e.g. conversion of pine plantation woodland to heathland, topsoil scraping, scrub removal). There would therefore be no permanent land-take for the Project.
Resource requirements (from the European site of from areas in proximity to the site)	Construction of the pipeline along the route would require excavations and clearance of vegetation within the SAC. The pipeline excavation and installation would likely generate spoil that could not be accommodated once the pipeline were in the ground. Woody material and spoil could be used to create habitat piles if agreed with Natural England and landowners. Any surplus material would be removed from site.
Emissions	The construction work for the Project would require plant and machinery that have the potential to generate dust and local emissions. The Project also has the potential to generate emissions (toxic and non-toxic) to ground- and surface water bodies within or connected to the SAC. Toxic emissions could be generated during construction by spillages of fuels or leaking construction plant. Non-toxic emissions could be generated during construction by uncontrolled silting of waterbodies or the discharge of nutrient-enriched runoff as a result of the excavations. Toxic emissions could be generated during pipeline operation as a result of pipeline leaks.
Excavation requirements	<u>General excavation/pipeline installation specifications</u> See Chapter 3 of the Scoping Report (Description of the Development) for more detailed information relating to excavations. Along the chosen route the pipeline would be constructed through a combination of open cut trenching and trenchless techniques. Open cut trenching would involve the cutting of a trench to a typical depth of approximately 1.5m and width of approximately 0.6m, although this would vary based on local conditions. Trenchless techniques would likely require a pit or shaft at each end of the pipeline section. The requirements for separate stripping, excavation, handling and storage of topsoil and subsoils would depend on local conditions and would follow good practice guidance which would be secured through the CoCP, as outlined in Chapter 4 (Design Evolution) of the Scoping Report. <u>Excavations within the SAC</u> The project has the following excavation requirements within the SAC:

	• Chobham Common SSSI – The route would be constructed within the SAC between approximately SU 99014 64629 and SU 96914 63552. The pipeline would likely be installed within or adjacent to a well-established and built-up track across the common between these two points, which follows the alignment of the existing pipeline. A construction methodology has yet to be confirmed. • Colony Bog and Bagshot Heath SSSI – The length of pipeline along the western edge of the SSSI would likely be constructed by open cut trenching within or adjacent to an existing broad, straight and well-established track along this route. Similarly, the pipeline in the north west and north east of the site would likely be constructed by open cut trenching within existing straight tracks across the site. The pipeline would avoid an area of valley mire (Folly Bog) (between approximately SU 92734 61265 and SU 91782 60933) by adopting an alignment within the existing track or through an area of heathland/secondary woodland. The exact route and design of the installation along the above routes have yet to be confirmed. However, the tracks within the SAC would in places not be wide enough to accommodate the full working requirements for the pipeline installation. Construction activity would likely be required in adjacent areas of habitat off the track. There may be a requirement for topsoil stripping along haul routes. Any operations outside of the track would be supported by appropriate good practice mitigation to reduce effects to soils and habitats, such as ground protection or ecological supervision. This would be confirmed and described in detail as the Project's design develops. The design of the construction working corridor, and thus the requirements for topsoil stripping and other movements of soil, would be modified in areas of particularly sensitive habitat, including water-dependent habitat such as wet heath: in such areas trenchless techniques or confined-width working methods may be adopted. Such methods would reduce the excavation requirements. Heathland soils are likely to require specialised handling and storage processes. This would be detailed in a soil management strategy, or similar, contained within a CEMP.
Transportation requirements	There would be traffic and transport associated with the Project during the construction phase, when construction plant would be transported to and from the SAC. The precise transportation requirements within the SAC are not currently known. Indicative conservative estimates for traffic calculations for rural and urban sections of the route (outside the SAC) are provided in Appendix 8.2 of the Scoping Report. There would be plant tracking within the SPA. Based on the section of the route between Boorley Green to Bramdean (considered to be a conservative estimate for a rural area) the construction plant and machinery are anticipated to consist of a mixture of the following types if open cut-trenching is adopted:

	• tracked machines, such as excavators, typically less than four; • dumper trucks (5-6 tonne); and • trench rollers. Further traffic and transportation may be required for maintenance or repair works during operation of the pipeline although this would be minimal and very infrequent.
Duration of construction, operation etc.	The Project is planned to commence main construction in March 2021, with construction lasting up to two years. Enabling works may commence before March 2021 at specific locations, for example vegetation removal, installation of fencing, or compound creation. The pipeline would be constructed in phases, with the duration of each construction phase expected to last between one and two months, depending on local conditions. The Project would be constructed within or adjacent to the SAC between 1st October to 31st January inclusive, i.e. outside of the bird breeding season (to avoid impacts to the Thames Basin Heaths SPA). Further details of constructions timelines will be confirmed as the Project design and programme develops. The design life of the replacement pipeline is 60 years. Pipeline operation would be supported by monitoring of pipeline condition and maintenance. Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area. Esso operates robust procedures to manage the pipeline and prevent leakage.
Description of avoidance and/or mitigation measures	
Nature of proposals	<u>Timing</u> All main construction activity within the SAC would be programmed for the period 1st October to 31st January to avoid the breeding season of the qualifying bird species of the Thames Basin Heaths SPA, which includes the SAC. <u>Construction methods</u> The exact design of the pipeline installation along the route has yet to be confirmed. The optimum working width required for the pipeline is 30m; this is influenced by health and safety guidelines, machinery size, and storage areas. However, this width would be reduced as much as possible when working within the SAC. Where possible, construction work areas would make use of existing tracks, although in many areas these would not be wide enough to accommodate the full working requirements for the pipeline installation. Any operations outside of the track would be supported by appropriate mitigation to reduce effects to habitats, such as ground protection or ecological supervision. The design of the construction working corridor would be modified in areas of particularly sensitive habitat, including water-dependent habitat such as wet heath: in such areas trenchless techniques or confined-width working methods may

	be possible, although this has yet to be confirmed. Areas of water-dependent habitat within the SAC that overlap the route are shown in Figures A4.4 and A4.5. The locations and sensitivities of such habitats along the route within the SAC will be confirmed through survey work as part of the Environmental Impact Assessment for the Project, and to inform this HRA. Site compounds would also be required to be sited within the SAC. The location of these would be chosen so as to reduce adverse effects to the SAC. <u>Good practice</u> The draft CoCP would incorporate agreed industry good practice standards that the contractor would be required to implement during construction, and would form the basis of the contractor's CEMP. Typical good practice standards to be incorporated into the CoCP are outlined in Chapter 4 (Design Evolution) of the Scoping Report but include measures to prevent and control pollution incidents, avoid or reduce air quality changes (e.g. dust), and avoid or reduce disturbance caused by noise or lighting. The CEMP would also contain specific method statements with respect to soil handling, storage and reinstatement. <u>Habitat restoration</u> The pipeline would be entirely below ground and so there would be no permanent loss of habitat. Where possible, the alignment of the route within the SAC would be positioned within tracks in order to reduce effects to heathland habitats and therefore the need for restoration. Any vegetation cleared or otherwise damaged in order to construct the pipeline along the route through the SAC would be reinstated. It is currently anticipated that reinstatement of the working area within the SAC would be achieved using natural regeneration from the reinstated topsoil (or subsoil, should it be preferred by key stakeholders that topsoil reinstatement is not desirable). If required, reseeding using seed and material sourced from adjacent habitat within the SAC could also be adopted. These approaches would be refined and agreed with Natural England and other key stakeholders, as the design of the Project develops. Full plans and work methods for habitat restoration and subsequent management and monitoring would be set out in the CoCP and CEMP that would support the Project's application for development consent. <u>Habitat enhancement</u> Opportunities for enhancement of habitat within the SAC (both within and outside the construction working area) would be explored. This is so that the Project provides a net gain for biodiversity. This might include the clearance of areas of secondary birch or pine woodland and restoration to heathland, or work to restore areas of species-poor mire habitat. Opportunities for habitat enhancement would be

	identified and agreed upon with Natural England, landowners and other key stakeholders. Full plans and work methods for habitat enhancement and subsequent management and monitoring would be set out in the CoCP and other relevant documents, such as a CEMP.
Location	All works within the SAC would be subject to the relevant embedded mitigation and good practice measures outlined above and in Chapter 4 (Design Evolution) of the Scoping Report. Location-specific mitigation or additional mitigation would be refined and detailed as the design of the Project develops and following consultation with Natural England and other key stakeholders.
Evidence for effectiveness	<u>Minimising the working area</u> Minimising the construction area of the Project would reduce the area of the SAC that would be directly affected. Minimising the area of effects is a well-established and effective mitigation strategy, and follows the preferred initial approach to mitigation set out in the 'biodiversity mitigation hierarchy' in national planning policy (Ministry of Planning, Housing and Local Government, 2012). <u>Construction good practice</u> Good practice guidelines are established and promoted by relevant environmental and construction institutions to ensure projects are delivered in compliance with required standards, policy and legislation. It is a standard approach for development projects to implement good practice guidelines. <u>Habitat restoration and enhancement</u> The Conservation Objectives of the SAC seek to maintain or restore heathland and mire vegetation, and maintain the open conditions of the site with scattered low trees and scrub (Natural England, 2016). The objective of habitat restoration and enhancement described above is therefore in line with the Conservation Objectives for the SAC and would provide a benefit to the site. Dry heathland vegetation establishes readily in areas of cleared ground on heaths, with key plant species generated from buried seed and dispersal from adjacent heathland habitat. It is a standard and effective conservation practice on heathlands to periodically scrape, cut or otherwise disturb areas of late successional vegetation, such as overgrown heathland vegetation or secondary woodland or scrub, in order to promote the regeneration of heathland habitat (e.g. Symes and Day, 2003). A recent pipeline project through the Thames Basin Heaths SPA that undertook post-construction heathland enhancements following clearance of plantation woodland found rapid establishment of dry heathland within two years, and has been commended by Natural England (South East Water, 2018). Post-construction restoration and enhancement works would emulate the above practices to restore areas of dry heathland. Areas of dry heathland, scrub or woodland cleared within the Order Limits for the project are therefore likely to successfully regenerate to dry

	heathland habitat following construction, and therefore reduce the long-term impact of the project on the dry heath qualifying feature of the SAC. The restoration of wet heathland is likely to be more complex and would require a bespoke mitigation and reinstatement strategy. Further details would be provided if impacts to wet heathland are anticipated.
Mechanisms for delivery (legal conditions, restrictions or other legally enforceable obligations)	All mitigation items set out above would be included in the CoCP and/or CEMP for the Project and would be secured, enforced and delivered through DCO Requirements and as outlined below. <u>Timing</u> The proposed timing would be embedded into the Project programme and secured through DCO Requirements. The contractor would plan and resource for all works within the SAC to be completed between 1st October and 31st January. No main construction works would be undertaken between February and September without prior approval from the competent authority. However, the trapping and translocation of GCN and reptiles would be undertaken between 1st August and the start of the hibernation period in October/November, as necessary. <u>Minimising the working area</u> The proposed working area would be established by the Project's Order Limits. The approved working area would be plotted on engineering drawings using CAD/GIS referencing and then demarcated on site using appropriate fencing. The position of the demarcation fencing would be approved by an ECoW before construction commenced. The fence would be regularly inspected and maintained by the contractor and ECoW throughout the duration of construction activity. No construction activity would encroach into areas beyond the demarcation fence. <u>Construction good practice</u> Construction good practice would be delivered through the CEMP and enforced through regular site audits and supervision by the ECoW, and the provision of toolbox talks. <u>Habitat restoration and enhancement</u> Full plans and work methods for habitat restoration and enhancement and subsequent management and monitoring would be set out in the CoCP, CEMP or other relevant delivery document. All habitat restoration and enhancement works would be undertaken by an appropriately experienced contractor, and would be supervised by ECoW.
Assessment criteria	
Initial assessment	
Disturbance to key species or habitats	

Disturbance of qualifying habitats of the SAC as a result of changes to substrate properties

The supplementary advice on the Conservation Objectives of the SAC (Natural England, 2016) identifies as targets for the 'European dry heaths' and 'North Atlantic wet heaths with *Erica tetralix*' features the need to maintain the properties of the underlying soil types (including structure, bulk density, total carbon, pH, soil nutrient status and fungal to bacterial ratio) to within typical values. Excavations for the Project would disturb substrates, including for the excavation of the pipeline trench and for any topsoil stripping within the construction working area. This could have implications for the drainage, nutrient cycling etc. of qualifying habitats of the SAC.

There would be no permanent land-take for the Project and all substrates and habitats would be restored as part of good practice measures. The main effect of changes to substrate would therefore be influenced by habitat restoration (this is discussed below).

There could be additional changes to substrates arising from material installed permanently in support of the pipeline, e.g. the use of inert aggregates or concrete. These may result in long-term changes to substrate chemistry (e.g. increase in pH resulting from leaching of calcium from concrete) during and beyond the lifetime of the pipeline that could affect qualifying habitats of the SAC leading to degradation or loss. It would be difficult to mitigate any such changes once these materials were installed into the ground. Presently, there is no information on the kind of materials that might be required to support the installation or whether they would be necessary within the SAC.

As there is a need for further information, the pathway for LSE by changes to substrate properties should therefore be considered at Appropriate Assessment (or re-screened at Stage 1 if the design changes significantly).

Hydrological disturbance of qualifying habitats of the SAC

This section discusses the likelihood and significance of hydrological changes resulting from the Project.

Water-dependent habitats are a qualifying feature of the SAC, i.e. the Annex I habitats 'North Atlantic wet heaths with *Erica tetralix*' and 'depressions on peat substrates of the *Rhynchosporion*'. These habitats can be ground- or surface water dependent or rainwater dependent (ombrotrophic) (but less likely the latter in the current context), and are very sensitive to changes in the supply and quality of water. Currently the mechanisms that support these habitats within the SAC along the route are not known.

Given the above sensitivities, a pathway to LSE exists by disturbing the hydrological and hydrogeological functioning (hydroecology) of the qualifying habitats of the SAC through changes to ground conditions and drainage arising during construction and/or through the permanent presence of the buried pipeline. Depending on the habitat and its hydroecological functioning, the zone of influence within which hydrological changes could arise could be extensive, with effects arising along very diffuse pathways.

The exact locations and areas of the qualifying water-dependent habitats along the route within the SAC are currently unknown based on objective information. However, the priority habitat inventory (Natural England, 2018) shows abundant 'Lowland Heathland' (i.e. 'European dry heaths' and/or 'North Atlantic wet heaths with *Erica tetralix*') with smaller and localised areas of 'Lowland Fens' (i.e. 'depressions on peat substrates of the *Rhynchosporion*' and other mire habitats, including potentially 'North Atlantic wet heaths with *Erica tetralix*') within the Order Limits (Figures A4.4 and A4.5).

Within Chobham Common SSSI, habitat mapped as 'Lowland Fens' along the route is found scattered in small areas within the Order Limits, including to either side of the track into which the pipeline would potentially be constructed (Figure A4.4). These areas could be impacted by construction although the precise route through Chobham Common SSSI has yet to be finalised.

Within Colony Bog and Bagshot Heath SSSI, the largest of area of 'Lowland Fens' shown near to the route is within the area known as Folly Bog (Plate 4). Small areas mapped as 'Lowland Fens' are also present within ditches at the edges of the tracks at various locations adjacent to the route (e.g. see Plate 6 and Figure A4.5). The route has been designated to avoid Folly Bog, but there remain areas of 'Lowland Fens' within the Order Limits that could be impacted by construction. The precise route through Colony Bog and Bagshot Heath SSSI has yet to be finalised.

There is currently uncertainty about the location and hydroecological function of these water-dependent habitats within the SAC and how they would interact with the route. Moreover, the location of the current route does not take full account of all water-dependent habitats as currently understood. There are likely areas of water-dependent habitat within the Order Limits which could be directly hydrologically disturbed by construction and operation of the pipeline. At this stage in the Project, there is insufficient information available to design an appropriately detailed mitigation strategy that could reduce (beyond reasonable scientific doubt) impacts of construction activities to water-dependent qualifying habitats. Changes to hydrology could also affect the efficacy of restoration proposed as mitigation for the Project.

As there is a need for further information, the pathway for LSE by hydrological changes should be considered at Appropriate Assessment (or re-screened at Stage 1 if the route changes significantly).

<u>Disturbance of qualifying habitats of the SAC as a result of the spread of invasive non-native species</u>

The SAC is vulnerable to the spread of a number of invasive non-native plant species, e.g. rhododendron (*Rhododendron ponticum*) which are potentially present within the Order Limits (Natural England, 2016). The spread of such species could negatively alter habitat structure and eventually the loss of qualifying habitats, and could result from ground disturbance caused by construction activities as part of the Project.

Ground disturbance caused by construction activities as part of the Project could spread invasive species into new areas of the SAC. However, this would be controlled by standard good practice measures which would operate across the project independent of consideration of effects to the SAC, as outlined in Chapter 4 (Design Evolution) of the Scoping Report. This would be secured through a CoCP that would be provided to support the Project's application for development consent.

Furthermore, the area of habitat likely to be affected by construction activity would be very small when compared to the total area of the SPA. In the unlikely event that invasive non-native plants were introduced to new areas, there is considered to be negligible potential for this to result in LSE.

Reduction of habitat area

<u>Physical loss of qualifying habitats of the SAC</u>

It is currently anticipated that construction activity would be focussed on or around existing tracks, if practicable. However, even under this scenario habitat adjacent to the track

would likely require removal as the tracks are generally not wide enough to accommodate all construction activities.

The Order Limits encompass an area of approximately 44ha within Chobham Common SSSI and approximately 10.5ha within Colony Bog and Bagshot Heath SSSI. However, it is not expected that all of the habitat within the Order Limits would be affected. Construction works areas would be defined once a final alignment through the SAC has been identified.

Based on the priority habitat inventory mapping (Natural England, 2018) of this area, approximately 5.9ha of the route comprises 'Lowland Heathland' (i.e. 'European dry heaths' or 'North Atlantic wet heaths with *Erica tetralix*'), 3.9ha of 'Lowland Fens' (i.e. 'depressions on peat substrates of the *Rhynchosporion*' and other mire habitats including potentially 'North Atlantic wet heaths with *Erica tetralix*'), and 3.1ha comprises deciduous woodland (likely including secondary woodland and successional scrub), as shown in Figures A4.4 and A4.5. These areas of 'Lowland Heathland' and 'Lowland Fens' comprise approximately 1.8% of the total area of qualifying habitats of the SAC according to the areas quoted on the standard data form for the SAC (JNCC, 2016). The area occupied by the Order Limits is approximately 0.35% of the total SAC area.

Areas mapped as 'Lowland Heathland' within the SAC are not uniform, but comprise a diversity of habitats, including sub-optimal secondary woodland and scrub, as found during site walkovers in March and April 2018 (e.g. Plate 5). The total area of the 'European dry heaths' within the SAC is approximately 1,830ha (Natural England, 2016). The area of 'Lowland Heathland' priority habitat within the Order Limits therefore represents approximately 0.32% of the overall habitat, a small proportion of the total area of this feature. Moreover, as part of the proposed mitigation for the Project, areas of heathland would be restored following construction works, which for dry heathland habitats is a standard conservation practice and can be successful within a short time period of 2-3 years. There is therefore confidence in the reinstatement methods that would be applied with respect to dry heathland. Therefore, with the proposed mitigation in place the effect on the SAC of loss of this qualifying habitat is considered to be *de minimis*, even though there would be a temporary loss of 'European dry heaths'.

The Annex I habitat 'depressions on peat substrates of the *Rhynchosporion'* comprises a variety of vegetation types found in bog pools, runnels, seepage areas, valley mire and quaking bogs, any of which could be captured by the priority habitat 'Lowland Fens'. The total area of 'Lowland Fens' (6.7ha) within the Order Limits is large compared with the total area of 'depressions on peat substrates of the *Rhynchosporion*' provided on the SAC standard data form (5.15ha) (JNCC, 2016). The SAC's Conservation Objectives state that 35.3ha of this feature is present within the SAC (Natural England, 2016), of which the area of 'Lowland Fens' within the Order Limits would comprise approximately 19%.

The Conservation Objectives for the SAC set as a target for the 'depressions of peat substrates of the *Rhynchosporion*' feature that there should be no measurable net reduction in extent and area of this habitat, except by natural changes. There is currently an uncertainty over the area of this qualifying habitat within the Order Limits and how it may be affected by the Project. However, in a worst-case scenario, the total loss of this habitat within the Order Limits (i.e. up to 19% of the feature within the SAC) would constitute a significant effect to the SAC.

At this early stage in the Project, detailed avoidance, mitigation and reinstatement measures for water-dependent qualifying habitats are uncertain but will be developed based on the results of further surveys and consultation, and as the Projet design

matures. Given this uncertainty and the potentially large area of water-dependent qualifying habitat potentially effected, the Project could result in LSE. The pathway for LSE by loss of water-dependent qualifying habitats should therefore be considered at Appropriate Assessment (or re-screened at Stage 1 if the route changes significantly).

Loss of qualifying habitat of the SAC due to toxic or non-toxic contamination

The Project has the potential to generate emissions (toxic and non-toxic) to ground- and surface water bodies, either as a result of construction activities (accidental spillages, silting etc.) or as a result of pipe leaks during operation. This could damage qualifying habitats of the SAC.

Contamination of ground- and surface water bodies would be controlled during construction by the good practice measures (e.g. following the guidance of DEFRA and EA, 2016), as outlined in Chapter 4 (Design Evolution) of the Scoping Report. This would be secured through the CoCP which would be provided to support the Project's application for development consent.

The risk of operational contamination is also considered to be extremely low due to the design of the pipeline and monitoring that would occur throughout its operational lifetime. Indeed, Esso has confirmed that there have been no known major pollution incidents from the aviation fuel pipeline in the study area. Esso operates robust procedures to manage the pipeline and prevent leakage.

Adherance to engineering good practice and professional standards of pipeline design and monitoring would mitigate the likelihood/impact of leaks during operation. Given these measures, the risk of toxic or non-toxic contamination of the SAC as a result of the Project is not considered likely.

Loss of qualifying habitats of the SAC due to air quality changes

Appendix 8.1 of the Scoping Report provides detailed information relating to air quality.

The qualifying habitats of the SAC are sensitive to changes in air quality resulting from pollution, including the generation of dust and combustion exhaust gases (such as NO_x compounds and SO_2).

Construction activities for the Project are considered to have the potential to generate effects associated with dust deposition within 50m of works areas (IAQM, 2014). Excessive dust deposition can significantly change the nature of the supporting habitat for the qualifying features (Natural England, 2016). However, all construction activity would comply with relevant good practice guidelines (e.g. those recommended by IAQM (2014)). Main construction works within the SAC would be restricted to the period between 1st October and 31st January, during which period activities would be less likely to generate significant amounts of dust as the ground and atmospheric conditions are typically damp. As such, possible effects to heathland vegetation would be reduced when compared to construction works undertaken during the summer. Furthermore, as the proposed works would be temporary and of short duration, any effects of dust are therefore considered not likely to be significant to the SAC.

Construction activities for the Project have the potential to generate effects associated with air pollution by combustion exhaust gases arising from construction activities, leading to the deposition of nitrogen and acidifying pollutants that can adversely affect the composition and structure of vegetation. The SAC is already in exceedance of critical loads for nitrogen deposition (maximum critical load for 'depression on peat substrates of the *Rhynchosporion*': 15 kg N/ha/yr; current deposition: 16.1kg N/ha/yr) and in exceedance of the minimum critical load for acid deposition (Air Pollution Information

System, 2017). The deposition of pollutants may therefore have an effect at the SAC sites through which the route passes.

IAQM guidance (2014), specifies that '*experience with assessing the exhaust emissions from on-site plant and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed*'. Effects of construction activities resulting from air quality are therefore likely to be *de minimis*. Moreover, construction works would be of short duration and relatively low intensity, with relatively low numbers and sizes of plant and machinery items anticipated to operate for the construction of the pipeline simultaneously (see Appendix 8.1 of the Scoping Report). As the most significant negative effects of nitrogen and acid deposition likely to affect the qualifying features of the SAC (e.g. degeneration of cover by subshrubs and increase in grass cover) develop with long-term deposition (Stevens, et al., 2011), the short term nature of deposition arising from Project activities would also indicate that any effects are likely to be *de minimis*.

Habitat or species fragmentation

Habitat loss can have indirect negative effects due to fragmentation of habitats or populations, impairing the ability of organisms to disperse, fulfil the requirements of their life cycle and thus sustain viable populations. However, the pipeline would be entirely below ground so that there would be no permanent barrier to dispersal and all habitat effected would be restored. The construction working width within the SAC would be reduced as much as possible, with some of this positioned in existing tracks (e.g. around 3-5m wide at Chobham Common. There is therefore an existing effect of habitat fragmentation. The construction works area would not constitute a new barrier to dispersal but only a temporary extension of an existing barrier. No fragmentation effects to the qualifying features are therefore predicted.

Reduction in species/habitat density

Using areas provided on the SAC standard data form, approximately 70% of the SAC comprises 'European dry heaths'. Based on the Order Limits, only approximately 0.32% of the feature may be temporarily affected by the Project, as described above. Changes to habitat density of this feature resulting from the Project are therefore considered to be *de minimis*.

For the much more spatially restricted qualifying habitats 'Atlantic wet heaths with *Erica tetralix*' and 'Depressions on peat substrates of the *Rhynchosporion*', changes in overall extent are more likely to be significant, and are discussed above.

Changes in key indicators of conservation value (water quality etc.)

The Conservation Objectives of the SAC cite the following as key attributes against which conservation success can be measured: the extent and distribution of the qualifying habitats; the structure of the vegetation of the qualifying habitats in terms key plant species; presence of invasive non-native species; water chemistry; air quality; substrate properties; cover by trees and gorse.

Of these, the extent and distribution of qualifying habitats, vegetation structure, invasive non-native species, water chemistry, air quality and substrate properties are discussed above.

Opportunities will be sought to reduce cover by trees and gorse, which the Conservation Objectives aim to maintain at no more than 10% density within areas of the qualifying

habitats. It is therefore anticipated that the Project could provide a net-gain for qualifying features.
Climate change
Activities associated with the Project would be of short duration and any changes to the landscape local and temporary. By appropriately mitigating longer-term risks (such as potential risks of contamination during construction and operation) as described above, it is considered that the Project is unlikely to effect the SAC in combination with long-term landscape changes that might occur as a result of climate change.
Likely impacts on the European site as a whole in terms of
Interference with the key relationships that define the structure of the site
The key structural relationships of the qualifying habitats of the SAC comprise: the structure of vegetation and its management across the site; physical pathways for dispersal; and other aspects of the life cycles of the key plant species. With the exception of site management, these are discussed above. With respect to site management, the Project would not interfere with management of the whole SAC. Temporary disruption to management activities might arise during the construction period but these areas would be very localised and likely confined to areas around existing tracks.
Interference with the key relationships that define the function of the site
The key functional relationships of the qualifying habitats of the SAC comprise processes involving substrate, hydrology, hydrogeology, air quality and vegetation succession. These functional relationships and effects of the Project to them in terms of impacts to site integrity are discussed above. Vegetation succession is also a function of site management, which would not be interfered with across the whole SAC by the Project, only temporarily and within a localised area.
Significance as a result of the identification of effects set out above in terms of:
Disturbance to key species
No LSE are anticipated based on the objective information provided above.
Reduction of habitat areas
There is the potential for LSE to result from loss of water-dependent qualifying habitats
Habitat or species fragmentation
No LSE are anticipated based on the objective information provided above.
Disturbance
No LSE are anticipated based on the objective information provided above.
Changes to key elements of the site (e.g. water quality, hydrological regime etc.)
There is the potential for LSE to result from changes to substrates, and changes to hydrological regimes of water-dependent qualifying habitats
Of the above, elements of the Project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known

No combinations of elements of the Project are anticipated to result in LSE based on the objective information provided above.
Outcome of screening stage
There is the potential for LSE – site should be taken forward to Stage 2 Appropriate Assessment based on the current route.

Appendix E. In-combination Assessment

6.1.1 The results of an in-combination assessment will be provided in the final HRA report.

Appendix F. PINS DCO Screening Matrices

6.1.2 The matrices provided in Appendix 1 and Appendix 2 of Advice note 10 (Planning Inspectorate, 2017) will be provided in the final version of the report.

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Appendix 5.1

Water Framework Directive Screening and Scoping Assessment

Scoping Report Volume 1

Esso

JACOBS

Southampton to London Pipeline Project

Esso Petroleum Company Ltd.

Scoping Report Appendix 5.1 Water Framework Directive Screening and Scoping Assessment

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1. Introduction

1.1 Project Overview

1.1.1 Esso Petroleum Company, Limited (Esso) is looking to replace 90km (56 miles) of its existing 105km (65 miles) aviation fuel pipeline that runs from the Fawley Refinery near Southampton, to the West London Terminal storage facility in Hounslow. Within the Scoping Report, this replacement is referred to as the Project. Esso have already replaced 10km of pipeline between Hamble and Boorley Green in Hampshire and now wants to replace the 90km of pipeline between Boorley Green and the West London Terminal storage facility in Hounslow.

1.1.2 Since the existing pipeline was built, Hampshire and Surrey have changed significantly. The South Downs National Park and many other protected sites have been established along the existing pipeline.

1.1.3 A number of corridor options for the replacement pipeline route were identified and assessed. The number of corridor options was reduced to a single preferred corridor, within which a route for the replacement pipeline has been identified. The route referred to within the Scoping Report is defined as the alignment of the pipeline from Boorley Green to the West London Terminal storage facility. The areas of land to be permanently or temporarily used for the Project are known as the Order Limits.

1.1.4 The Project is classified as a Nationally Significant Infrastructure Project (NSIP) and will require a Development Consent Order (DCO) to give consent to install the pipeline, under the Planning Act 2008. The Project also falls within the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations), which require an Environmental Statement (ES) to be prepared and submitted with the application for development consent.

1.2 Purpose of the Report

1.2.1 This report is a technical appendix to the SLP Scoping Report. The purpose of the report is to provide an overview of the initial screening and scoping stages for the Water Framework Directive (WFD) Assessment, in line with The Planning Inspectorate Advice Note 18 and WFD legislative requirements.

1.2.2 As part of ongoing design development, the pipeline proposals were amended in places to reduce potential impacts. A summary of this design evolution is provided in Chapter 4 of the SLP Scoping Report, along with a description of the process followed to select the preferred corridor.

1.2.3 In addition to mitigation embedded in design evolution, a Code of Construction Practice (CoCP) will be submitted with the application for development consent. This document will include ‘good practice’ measures or requirements to avoid, reduce and control adverse effects during construction. The pipeline installation contractor will be required to prepare a Construction Environmental Management Plan (CEMP) and comply with the CoCP. Chapter 4 of the SLP Scoping Report includes information on

good practice measures and an outline CoCP is provided in Appendix 1 of the SLP Scoping Report.

1.2.4 As a result of embedded and good practice mitigation, a number of the baseline features can be "scoped out" of the WFD Assessment as there is unlikely to be a significant impact on them. In this way, only the features that could suffer a significant effect are recommended for further study.

1.3 Assessment Background

1.3.1 The WFD (2000/60/EC) is a significant piece of EU water legislation that came into force in 2000, with the overarching objective of requiring all water bodies in Europe to attain Good or High ecological status/potential. The WFD is implemented in England and Wales through The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Ecological status/potential comprises of a series of biological, physico-chemical and hydromorphological 'quality elements', which should not be allowed to deteriorate in the event of modifications being made to the water body. The Environment Agency is the competent authority in England for delivering WFD objectives.

1.3.2 Good ecological status (GES) refers to water body characteristics that show only a slight deviation from a natural/near natural condition. Artificial and Heavily Modified Water Bodies (A/HMWB) have a target to achieve Good ecological potential (GEP), recognising their socio-economic importance, whilst ensuring that the WFD water body is protected as far as possible.

1.3.3 The WFD outlines a number of objectives including:

- Prevent deterioration in the status of water bodies;
- Aim to achieve GES and good surface water chemical status in water bodies by 2021 or 2027 (depending on feasibility);
- For water bodies designated as artificial or heavily modified, aim to achieve GEP by 2021 or 2027 (depending on feasibility);
- Reduce pollution from priority substances and cease discharges, emissions and losses of priority hazardous substances; and
- Comply with objectives and standards for protected areas where relevant.

1.3.4 Where a scheme is considered to cause deterioration, or where it could contribute to a failure of the water body to meet GES/GEP, then an Article 4.7 assessment is required. Should a modification or change meet all of the conditions set out in Article 4.7 then it is considered as being WFD compliant.

1.4 Study Area

1.4.1 A study area has been defined for the WFD screening and scoping stages by taking into account all WFD water bodies potentially affected by the Project. For the WFD screening stage, the study area is defined by a 500m buffer from the pipeline route.

This allows for the identification of WFD water bodies that could be directly and/or indirectly impacted as a result of the construction and operation of the pipeline. For the WFD scoping stage, the study area is narrowed to cover the proposed Order Limits of the Project in order to identify those receptors that are likely to be crossed.

1.4.2 Along the 90km pipeline corridor, the study area crosses 39 surface WFD water bodies (34 fluvial, one lacustrine, two transitional and coastal and two artificial) and 10 groundwater WFD water bodies across the Thames and South East River Basin Districts.

2. Methodology

2.1 Data Sources

2.1.1 A desk based study has been carried out to inform this assessment, reviewing existing information for the route and study area to develop an initial baseline for the WFD water bodies. The following are the key data sources:

- Environment Agency Catchment Explorer (Environment Agency, 2018);
- South East River Basin Management Plan (Environment Agency, 2015);
- Thames River Basin Management Plan (Environment Agency, 2015);
- Contemporary OS maps (Natural England, 2018);
- Geology maps (BGS, 2018);
- Soils maps (BGS, 2018);
- Aerial photography (Natural England, 2018);
- Historical maps (National Library of Scotland, 2018); and
- Designated areas (Natural England, 2018).

2.1.2 At this stage, no site work has been undertaken to support the screening and scoping assessments. As a result, the following WFD assessment is based on desk study information only, with aerial imagery used to provide an understanding of the general character of the receptors within the study area. Further assessment will be undertaken and could lead to changes in the assumptions and information provided in this initial assessment.

2.2 WFD Assessment Methodology

2.2.1 The following assessment draws on key guidance provided by the Environment Agency, UKTAG (UK Technical Advisory Group) and The Planning Inspectorate (PINS) Advice Note 18 (PINS, 2017).

2.2.2 The following outlines the proposed sequence for undertaking the WFD assessment to determine the compliance of the Project with the WFD objectives and legislation. It is formed of three key stages:

Stage 1: WFD Screening

2.2.3 The screening stage identifies the extent to which the Project is likely to affect the WFD water bodies, defining the zone of influence and providing a justification for

excluding receptors, Project activities and environmental topic areas. This stage includes:

- Identifying the relevant River Basin Management Plans and WFD water bodies;
- Outlining the Project elements; and,
- Identifying the study area and the potential zone(s) of influence from the Project on the WFD water bodies and whether any aspects can be screened out and why.

Stage 2: WFD Scoping

2.2.4 The scoping stage identifies the potential risks of Project activities impacting on the WFD water bodies screened in for assessment. This stage includes:

- An initial assessment to identify the risks from the Project and what aspects require a detailed assessment;
- Identifying which WFD water bodies require further assessment; and,
- Identifying which WFD quality elements are scoped in for each WFD water body.

Stage 3: WFD Impact Assessment

2.2.5 The WFD impact assessment is a detailed assessment of the WFD water bodies and Project activities carried forward from the WFD screening and scoping stages. This includes the:

- Identification of baseline conditions of the biological, physico-chemical and hydromorphological quality elements;
- Description of the Project;
- Identification of potential impacts from the Project on quality elements;
- Review of actions to deliver WFD specific mitigation measures; and,
- Assessment of the Project against WFD status objectives, other EU legislation and overall compliance (including identification of required mitigation and/or enhancements).

2.3 Structure of this Report

2.3.1 This WFD Screening and Scoping Assessment will address Stage 1 and 2 of the proposed WFD methodology outlined in Section 2.2. This is presented in Sections 3 and 4 respectively for the Screening and Scoping stages. The requirements of a detailed assessment, i.e. Stage 3, will be outlined in Section 5 of this report.

3. Stage 1: WFD Screening

3.1 Introduction

3.1.1 This section identifies the relevant River Basin Management Plans and WFD water bodies (surface and groundwater) that could be directly impacted by the Project. Consideration is also given to those WFD water bodies potentially indirectly impacted in the wider River Basin District (i.e. those upstream and downstream). An overview of the relevant Project elements is outlined in Section 3.2. Section 3.3 provides a summary of those WFD water bodies screened in and out for further assessment (see Section 4).

3.2 Project Elements

3.2.1 A detailed description of the Project is provided in Chapter 3 of the SLP Scoping Report. The main elements that need to be assessed for compliance with the WFD are as follows:

Construction

- Crossing of watercourses using open-cut crossing techniques;
- Interaction with groundwater as a result of various trenchless crossing techniques;
- Crossing of watercourse and water features by haul roads using culverts and flumes;
- Temporary construction drainage; and
- Construction of site compounds.

Operation

- Interaction of pipeline and associated infrastructure with groundwater bodies.

3.3 Identification of Relevant WFD Water Bodies

3.3.1 An initial exercise was undertaken to identify the WFD water bodies potentially impacted by the Project within the study area, both directly and indirectly. An initial assessment has then been made to determine whether the WFD water bodies should be screened in for further assessment or whether, due to likelihood of limited impacts, they can be screened out.

3.3.2 Table 3.1 provides a summary of the WFD Screening which is provided in detail in Table 3.2. In total 39 surface water and 10 groundwater WFD water bodies were

initially identified, of which 23 and 10 respectively have been screened in for further assessment and will be carried forward to Stage 3: Scoping (see Section 4).

Table 3.1: Summary of screening assessment (stage 1), with an overview of the WFD water bodies screened in for further assessment (stage 2)

WFD water body type		Total identified	Total screened in
Surface water	Fluvial	34	19
	Lacustrine	1	1
	Transitional and coastal	2	1
	Artificial	2	2
Groundwater		10	10

3.3.3 Figure A5.1.1 and A5.1.2 provide an overview of the surface water and groundwater WFD water bodies (respectively) that have been screened in. Table 3.2 provides a list of all the WFD water bodies initially identified and a justification as to whether they have been screened in or out of further assessment against the WFD legislation and objectives. Anticipated impacts associated with the Project are likely to be highly localised. Any up- or downstream WFD water body located over 1km from the Project are unlikely to be impacted and, therefore, have been screened out for further assessment.

Table 3.2: Screening summary (note: screening shown as 'in' or 'out')

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
Fluvial						
South East	East Hampshire	Main River Hamble	GB107042016250	Moderate status	In	Directly crossed by the Project study area.
		Moors Stream	GB107042016260	Good status	Out	This WFD water body is located approximately 2.8km upstream of the Project study area. Impacts not considered to migrate upstream due to the scale and nature of the Project.
		Horton Heath Stream	GB107042016270	Good potential	In	Directly crossed by the Project study area.
		Upper Hamble	GB107042016280	Moderate status	In	Directly crossed by the Project study area.
	Test and Itchen	Itchen (Cheriton Stream)	GB107042016670	Good status	In	Directly crossed by the Project study area.

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
		Itchen	GB107042022580	Good status	Out	The Itchen is the downstream WFD water body of the Itchen (Cheriton Stream) and the Arle WFD water bodies. This WFD water body is located approximately 8km downstream of the SLP study area and, as works are not considered to lead to any impacts this distance downstream, has been screened out of further assessment.
		Arle	GB107042022610	Good status	In	Directly crossed by the Project study area.
Thames	Wey and Trib	Caker Stream	GB106039017730	Moderate status	In	Directly crossed by the Project study area.
		North Wey (Alton to Tilford)	GB106039017830	Moderate status	In	Directly crossed by the Project study area.

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
		Wey (Tilford to Shalford)	GB106039017820	Poor status	Out	The Wey (Tilford to Shalford) is the downstream WFD water body of North Wey (Alton to Tilford) WFD water body. This WFD water body is located approximately 20km downstream of the Project study area and, as works are not considered to lead to any impacts this distance downstream, has been screened out of further assessment.
		North Wey at Alton	GB106039017800	Moderate potential	Out	The North Wey at Alton is the downstream WFD water body of the North Wey (Alton to Tilford) WFD water body. This WFD water body is located approximately 2.1km upstream of the Project study area and, as works are not

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
						considered to lead to any impacts this distance upstream, has been screened out of further assessment.
	Loddon and Trib	Hart (Crondall to Elvetham)	GB106039017090	Poor status	In	Directly crossed by the Project study area.
		Hart (Elvetham to Hartley Wintney)	GB106039017170	Poor status	Out	The Hart (Elvetham to Hartley Wintney) is the downstream WFD water body of Hart (Crondall to Elvetham) and Fleet Brook WFD water bodies. This WFD water body is located approximately 7km downstream of the Project study area and, as works are not considered to lead to any impacts this distance downstream, has been screened out of further assessment.
		Fleet Brook	GB106039017120	Moderate potential	In	Directly crossed by the Project study area.

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
		Cove Brook	GB106039017130	Bad status	In	Directly crossed by the Project study area.
		Blackwater (Hawley to Whitewater confluence at Bramshill)	GB106039017290	Moderate status	Out	The Blackwater (Hawley to Whitewater confluence at Bramshill) is the downstream WFD water body of Cove Brook and Blackwater (Aldershot to Cove Brook confluence at Hawley) WFD water bodies. This WFD water body is located approximately 1.4km downstream of the Project study area and, as works are not considered to lead to any impacts this distance downstream, has been screened out of further assessment.

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
		Blackwater (Aldershot to Cove Brook confluence at Hawley)	GB106039017180	Poor status	In	Directly crossed by the Project study area.
	Wey and Trib	Addlestone Bourne (West End to Hale/Mill Bourne confluence at Mimbridge)	GB106039017920	Moderate status	In	Directly crossed by the Project study area.
		Hale/Mill Bourne (Bagshot to Addlestone Bourne confluence near Chobham)	GB106039017930	Moderate status	In	Directly crossed by the Project study area.
		Chertsey Bourne (Virginia Water to Chertsey)	GB106039017070	Moderate potential	In	Directly crossed by the Project study area.

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
		Chertsey Bourne (Ascot to Virginia Water)	GB106039017050	Poor status	Out	The Chertsey Bourne (Ascot to Virginia Water) is the upstream WFD water body of Chertsey Bourne (Virginia Water to Chertsey) WFD water body. This WFD water body is located approximately 12km upstream of the Project study area and, as works are not considered to lead to any impacts this distance upstream, has been screened out of further assessment.
		Chertsey Bourne (Sunningdale to Virginia Water)	GB106039017040	Poor status	Out	The Chertsey Bourne (Sunningdale to Virginia Water) is the upstream WFD water body of Chertsey Bourne (Virginia Water to Chertsey) WFD water body. This WFD water body is located

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
						approximately 12km upstream of the Project study area and, as works are not considered to lead to any impacts this distance upstream, has been screened out of further assessment.
		Chertsey Bourne (Chertsey to River Thames confluence)	GB106039017030	Poor status	In	Directly crossed by the Project study area.

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
		The Moat at Egham	GB106039017060	Poor potential	Out	The Moat at Egham is the upstream WFD water body of Chertsey Bourne (Chertsey to River Thames confluence) WFD water body. This WFD water body is located approximately 2.1km upstream of the Project study area and, as works are not considered to lead to any impacts this distance upstream, has been screened out of further assessment.
		Addlestone Bourne (Mill/Hale to Chertsey Bourne)	GB106039017020	Moderate status	In	Directly crossed by the Project study area.
	Maidenhead and Sunbury	Thames (Egham to Teddington)	GB106039023232	Poor potential	In	Directly crossed by the Project study area.

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
		Thames (Cookham to Egham)	GB106039023231	Moderate potential	Out	The Thames (Cookham to Egham) is the upstream WFD water body of Thames (Egham to Teddington) WFD water body. This WFD water body is located approximately 6km upstream of the Project study area and, as works are not considered to lead to any impacts this distance upstream, has been screened out of further assessment.
	Colne	Colne (Confluence with Chess to River Thames)	GB106039023090	Moderate potential	Out	The Colne (Confluence with Chess to River Thames) is an upstream WFD water body of Thames (Egham to Teddington) WFD water body. This WFD water body is located approximately 6km upstream of the Project

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
						study area and, as works are not considered to lead to any impacts this distance upstream, has been screened out of further assessment.
	London	Hogsmill	GB106039017440	Moderate potential	Out	The Hogsmill is an upstream WFD water body of Thames (Egham to Teddington) WFD water body. The confluence of the Hogsmill with the Thames is over 16km downstream of the Project study area. There is also not thought to be any direct hydraulic connectivity with the Project, and has therefore been screened out of further assessment.
	Mole	Mole (Hersham to	GB106039017622	Moderate potential	Out	The Mole (Hersham to R. Thames conf at East

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
		R. Thames conf at East Molesey)				Molesey) is an upstream WFD water body of Thames (Egham to Teddington) WFD water body. The confluence of the Mole with the Thames is over 11km downstream of the Project study area. There is also not thought to be any direct hydraulic connectivity with the Project, and has therefore been screened out of further assessment.
		Rythe	GB106039017650	Poor potential	Out	The Rythe is an upstream WFD water body of Thames (Egham to Teddington) WFD water body. The confluence of the Rythe with the Thames is over 11.5km downstream of the Project study area and has therefore been

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
						screened out of further assessment.
	Wey and Trib	Wey (Shalford to River Thames confluence at Weybridge)	GB106039017630	Moderate potential	Out	The Wey (Shalford to River Thames confluence at Weybridge) is an upstream WFD water body of Thames (Egham to Teddington) WFD water body. The confluence of the Wey with the Thames is over 2.4km downstream of the Project study area. There is also not thought to be any direct hydraulic connectivity with the Project, and has therefore been screened out of further assessment.
	Colne	Surrey Ash	GB106039023480	Moderate potential	In	Directly crossed by the Project study area.

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
	London	Portlane Brook	GB106039023451	Moderate potential	In	Directly crossed by the Project study area.
Lacustrine						
Thames	Colne	The Queen Mother Reservoir	GB30642334	Moderate potential	In	Directly crossed by the Project study area.
Transitional and Coastal						
South East	South East TraC	Southampton Water	GB520704202800	Moderate potential	In	Directly crossed by the Project study area.
Thames	Thames TraC	Thames Upper	GB530603911403	Moderate potential	Out	The Thames Upper is the downstream WFD water body of Thames (Egham to Teddington) WFD water body. The Thames Upper WFD water body is over 18.5km downstream of the Project study area and has therefore been screened out of further assessment.
Artificial						

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
Thames	Thames AWB	Basingstoke Canal	GB70610019	Moderate potential	In	Directly crossed by the Project study area.
		King George VI Reservoir water transfer	GB806100096	Moderate potential	In	Directly crossed by the Project study area.
Groundwater						
South East	South East GW	South East Hants Bracklesham Group	GB40702G503000	Poor status	In	Potentially directly impacted by Project.
		East Hants Lambeth Group	GB40702G500800	Poor status	In	Potentially directly impacted by Project.
		East Hants Chalk	GB40701G502700	Poor status	In	Potentially directly impacted by Project.
		River Itchen Chalk	GB40701G505000	Poor status	In	Potentially directly impacted by Project.
Thames	Thames GW	Alton Chalk	GB40601G604400	Good status	In	Potentially directly impacted by Project.
		Basingstoke Chalk	GB40601G501300	Poor status	In	Potentially directly impacted by Project.

River basin management plan	Operational catchment	WFD water body	ID	Overall status (2016)	Screening	Reasoning
		Old Basing Tertiaries	GB40602G601700	Poor status	In	Potentially directly impacted by Project.
		Farnborough Bagshot Beds	GB40602G601300	Good status	In	Potentially directly impacted by Project.
		Chobham Bagshot Beds	GB40602G601400	Good status	In	Potentially directly impacted by Project.
		Lower Thames Gravels	GB40603G000300	Good status	In	Potentially directly impacted by Project.

3.4 Screening of WFD Quality Elements

Surface Water

3.4.1 Table 3.2 provides information on the specific components which are taken into consideration when determining the status of each WFD quality element for fluvial, lacustrine and transitional and coastal WFD water bodies. For the purposes of this assessment, all the surface water WFD quality elements will be screened in for assessment.

Table 3.2: Specific quality elements for WFD surface water bodies

	Quality elements		
Surface water type	**Biological**	**Physico-chemical**	**Hydromorphological**
Fluvial	• Fish • Macroinvertebrates • Macrophytes and phytobenthos - diatoms • Macrophytes and phytobenthos - macrophytes	• pH • Ammonia (total as N) • Phosphate • Dissolved oxygen • Specific pollutants	• Quantity and dynamics of water flow • Connection to groundwater • River continuity • River depth and width variation • Structure and substrate of the river bed • Structure of the riparian zone
Lacustrine	• Chironomids (CPET) • littoral Invertebrates • Macrophytes • Phytobenthos • Phytoplankton • Macroinvertebrates	• pH • Ammonia (total as N) • Phosphate • Dissolved oxygen • Specific pollutants • Acid neutralising capacity	• Quantity and dynamics of water flow • Connection to groundwater • Lake depth variation • Quantity, structure and substrate of the lake bed • Structure of the lake shore

	Quality Elements		
Surface Water Type	**Biological**	**Physico-chemical**	**Hydromorphological**
Transitional and Coastal	• Fish (transitional only) • Macroalgae • Angiosperms • Invertebrates • Phytoplankton • Benthic invertebrates	• Dissolved inorganic nitrogen • Dissolved oxygen • Specific pollutants	• Freshwater flow • Depth variation • Quantity, structure and substrate of estuarine bed (transitional only) • Structure of intertidal zone • Wave exposure • Quantity, structure and substrate of coastal bed (coastal only) • Direction of dominant currents (coastal only)

Groundwater

3.4.2 Table 3.3 provides information on the specific components which are taken into consideration when determining the status of the qualitative and quantitative WFD quality elements for groundwater bodies. For the purposes of this assessment and taking into account the Project elements, all the groundwater WFD quality elements will be screened in for assessment.

Table 3.3: Specific quality elements for WFD groundwater bodies

	Quality Elements	
	Quantitative	**Qualitative**
Groundwater	• Groundwater dependent terrestrial ecosystems • Saline intrusion • Water balance	• Drinking water protected area • Groundwater dependent terrestrial ecosystems • Saline intrusion • Water balance

4. Stage 2: WFD Scoping

4.1 Project Components

4.1.1 Table 4.1 provides an overview of the Project components and indicates whether each has been scoped in for further assessment. This is based on the potential for impacts to occur on the WFD water bodies identified in Section 3 of this report. For the components scoped in, these will be assessed in detail during the next phase of the WFD assessment.

Table 4.1: Scoping of Project components for detailed assessment

Project component	Element	Scoped in or out?
Construction	Pipeline construction (including watercourse crossings)	In
	Haul roads	In – temporary impacts only, however, crossings of watercourses required and therefore assessment necessary.
	Off-site road access construction	In – no crossings proposed of surface watercourses and no impacts anticipated on groundwater. However, some roads are within close proximity to watercourses and drainage of roads yet to be confirmed.
	Set up of construction compounds	In – all compounds have been set back from watercourses; however, potential for drainage to enter watercourses (depending on design).
Operation	Operation of pipeline	In – potential impacts on groundwater.

4.2 WFD Water Body Quality Elements

Surface WFD Water Bodies

4.2.1 Table 4.2 summarises the WFD quality elements that have been scoped in for each WFD surface water body identified as requiring assessment in Section 3 (Screening). This is based on the Project components that could affect each WFD water body.

4.2.2 As a result of the scoping exercise, two artificial WFD water bodies have been scoped out of further assessment, the Basingstoke Canal and King George VI Reservoir water transfer (also known as the Staines Aqueduct). The pipeline crossing technique at the location of these two WFD water bodies would be

trenchless (see Section 5.1). Therefore, it is anticipated that there would be no long-term direct or indirect impacts on the WFD water bodies.

4.2.3 A further seven surface WFD water bodies have also been scoped out at this stage. The Project is unlikely to lead to any significant impacts on these WFD water bodies (including all contributing watercourses), with there being no watercourse crossings and a buffer between the watercourses and the construction corridor. The seven WFD water bodies are:

- Itchen (Cheriton Stream);
- Arle;
- Addlestone Bourne (West End to Hale/Mill Bourne confluence at Mimbridge);
- Addlestone Bourne (Mill/Hale to Chertsey Bourne);
- Portlane Brook;
- The Queen Mother Reservoir; and,
- Southampton Water.

Table 4.2: Project components and WFD quality elements scoped in for each WFD surface water body

WFD water body	Project components	Biological quality elements	Physico-chemical quality elements	Hydro-morphological quality elements
Main River Hamble	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓
Horton Heath Stream	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓
	Off-site access road.	✓	✓	✓
Upper Hamble	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓
	Compound.	✓	✓	✓
Caker Stream	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓

WFD water body	Project components	Biological quality elements	Physico-chemical quality elements	Hydro-morphological quality elements
	Off-site access road.	✓	✓	✓
	Compound.	✓	✓	✓
North Wey (Alton to Tilford)	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓
	Compound.	✓	✓	✓
Hart (Crondall to Elvetham)	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓
	Off-site access road.	✓	✓	✓
	Compound.	✓	✓	✓
Fleet Brook	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓
Cove Brook	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓
	Compound.	✓	✓	✓
Blackwater (Aldershot to Cove Brook confluence at Hawley)	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓
	Compound.	✓	✓	✓
Hale/Mill Bourne (Bagshot to Addlestone Bourne confluence near Chobham)	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓
	Off-site access road.	✓	✓	✓
	Compound.	✓	✓	✓
Chertsey Bourne	Pipeline construction (including watercourse crossings).	✓	✓	✓

WFD water body	Project components	Biological quality elements	Physico-chemical quality elements	Hydro-morphological quality elements
(Virginia Water to Chertsey)	Haul road.	✓	✓	✓
	Compound.	✓	✓	✓
Chertsey Bourne (Chertsey to River Thames confluence)	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓
	Off-site access road.	✓	✓	✓
	Compound.	✓	✓	✓
Thames (Egham to Teddington)	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓
Surrey Ash	Pipeline construction (including watercourse crossings).	✓	✓	✓
	Haul road.	✓	✓	✓

Groundwater WFD Water Bodies

4.2.4 Table 4.3 summarises the WFD quality elements that have been scoped in for each WFD groundwater body identified as requiring assessment in Section 3 (Screening). This is based on the potential Project components that could affect each WFD water body.

Table 4.3: Scoped in WFD quality elements for each groundwater water body

WFD water body	Project components	Quantitative elements	Qualitative elements
South East Hants Bracklesham Group	Pipeline construction (including watercourse crossings).	✓	✓
	Pipeline operation.	✓	✓
East Hants Lambeth Group	Pipeline construction (including watercourse crossings).	✓	✓
	Pipeline operation.	✓	✓
East Hants Chalk	Pipeline construction (including watercourse crossings).	✓	✓
	Pipeline operation.	✓	✓
River Itchen Chalk	Pipeline construction (including watercourse crossings).	✓	✓
	Pipeline operation.	✓	✓
Alton Chalk	Pipeline construction (including watercourse crossings).	✓	✓
	Pipeline operation.	✓	✓
Basingstoke Chalk	Pipeline construction (including watercourse crossings).	✓	✓
	Pipeline operation.	✓	✓
Old Basing Tertiaries	Pipeline construction (including watercourse crossings).	✓	✓
	Pipeline operation.	✓	✓
Farnborough Bagshot Beds	Pipeline construction (including watercourse crossings).	✓	✓
	Pipeline operation.	✓	✓
Chobham Bagshot Beds	Pipeline construction (including watercourse crossings).	✓	✓
	Pipeline operation.	✓	✓
Lower Thames Gravels	Pipeline construction (including watercourse crossings).	✓	✓

WFD water body	Project components	Quantitative elements	Qualitative elements
	Pipeline operation.	✓	✓

5. Recommendations and Baseline Overview

5.1.1 This report has provided an assessment of the potential WFD water bodies impacted by the Project. This has identified 24 WFD water bodies potentially impacted and requiring more detailed assessment. These are:

Surface Water

- Main River Hamble;
- Horton Heath Stream;
- Upper Hamble;
- Caker Stream;
- North Wey (Alton to Tilford);
- Hart (Crondall to Elvetham);
- Fleet Brook;
- Cove Brook;
- Blackwater (Aldershot to Cove Brook confluence at Hawley);
- Hale/Mill Bourne (Bagshot to Addlestone Bourne confluence near Chobham);
- Chertsey Bourne (Virginia Water to Chertsey);
- Chertsey Bourne (Chertsey to River Thames confluence);
- Thames (Egham to Teddington); and
- Surrey Ash.

Groundwater

- South East Hants Bracklesham Group;
- East Hants Lambeth Group;
- East Hants Chalk;
- River Itchen Chalk;
- Alton Chalk;
- Basingstoke Chalk;
- Old Basing Tertiaries;

- Farnborough Bagshot Beds;
- Chobham Bagshot Beds; and
- Lower Thames Gravels.

5.1.2 An initial overview of the baseline conditions and potential impacts on the WFD water bodies are outlined in Section 5.1 and 5.2 respectively. These provide a basis for the detailed assessment which will be undertaken in support of the application for development consent.

5.1 WFD Surface Water Bodies

5.1.1 Tables 5.1 to 5.14 provide an overview of the 14 WFD surface water bodies that have been scoped in for further assessment in Stage 3 as part of the EIA. A brief overview of the general characteristics of each WFD water body is provided, based on desk study information. In addition, any relevant watercourses forming the main WFD water body are included. Appendix A provides grid references for all watercourses crossed by the Project.

Table 5.1: Initial baseline overview of Main River Hamble WFD water body

Main River Hamble	
Water body ID	GB107042016250
Catchment size (km^2)	7.2
Hydromorphological designation	Not designated an Artificial or Heavily Modified Water Body (A/HMWB)
Overall status	Moderate
Biological status	**Good**
Fish	Good
Invertebrates	High
Macrophytes and phytobenthos combined	High
Hydromorphological supporting elements	**Supports good**
Hydrological regime	Supports good
Morphology	Supports good
Physico-chemical quality element	**Moderate**
Acid neutralising capacity	High
Ammonia (phys-chem)	High
Dissolved oxygen	Good
pH	High
Phosphate	Poor
Temperature	High
Mitigation measures assessment	**Not assessed**

Summary of watercourses within the study area	
Main River Hamble	The Main River Hamble has its source at the confluence of the Upper Hamble and Moors Stream, west of Botley Road (B3035). The watercourse has a sinuous planform for the majority of its length. Some channel modification can be noted from aerial imagery, with lengths of the channel having been straightened (for example between Calcot Lane to Mill Hill). The Main River Hamble is fed by a network of drains and smaller watercourses. The catchment land use is predominantly agricultural with a number of wooded areas located adjacent to the channel. Riparian vegetation along the channel consists primarily of large trees and mature vegetation.
Unnamed watercourse 1	The watercourse appears to be a winterbourne channel (i.e. the channel is dry in summer months). The channel flows along a tree lined field boundary and is likely to have been historically modified for agricultural purposes. Adjacent land use is predominantly agricultural.

Table 5.2: Initial baseline overview of Horton Heath Stream WFD water body

Horton Heath Stream	
Water body ID	GB107042016270
Catchment size (km^2)	15.9
Hydromorphological designation	Heavily Modified Water Body
Overall status	Good
Biological status	**Good**
Fish	Good
Invertebrates	Good
Macrophytes and phytobenthos combined	Good
Hydromorphological supporting elements	**Supports Good**
Hydrological regime	Supports good
Physico-chemical quality element	**Good**
Ammonia (phys-chem)	High

Dissolved oxygen	High
pH	High
Phosphate	Good
Temperature	High
Mitigation measures assessment	**Good**
Summary of watercourses within the study area	
Horton Heath Stream	The Horton Heath Stream typically has a straight planform from its source at Lower Upham to Horton Heath. Downstream of Horton Heath the planform becomes increasingly sinuous. Downstream of Horton Heath the vegetated riparian corridor becomes more established, with large trees and mature vegetation present along much of the channel bank tops. Land use is predominantly agricultural, with a large golf course also present in the north-west of the catchment.
Unnamed watercourse 2 and 3	Both watercourses appear to be winterbourne channels (i.e. the channel is dry in summer months), with a densely vegetated riparian corridor. The adjacent land use is predominantly agricultural.

Table 5.3: Initial baseline overview of Upper Hamble WFD water body

Upper Hamble	
Water body ID	GB107042016280
Catchment size (km^2)	38.1
Hydromorphological designation	Not designated an Artificial or Heavily Modified Water Body (A/HMWB)
Overall status	Moderate
Biological status	**Moderate**
Fish	Moderate
Invertebrates	Moderate
Macrophytes and phytobenthos combined	Good
Hydromorphological supporting elements	**Supports good**

Hydrological regime	Supports good
Morphology	Supports good
Physico-chemical quality element	**Moderate**
Ammonia (phys-chem)	High
Dissolved oxygen	Good
pH	High
Phosphate	Poor
Temperature	High
Mitigation measures assessment	**N/A**
Summary of watercourses within the study area	
River Hamble	The River Hamble has its source north of Bishop's Waltham and flows south to its confluence with Southampton Water. The channel planform is typically sinuous. Within the study area, the river passes through Bishop Waltham and has been modified as a result of the urban setting. Some flow is diverted from the River Hamble to feed Bishop's Waltham Pond, with the main channel then culverted beneath the village. The River Hamble is joined by an unnamed watercourse to the south-west of the village.
Unnamed watercourse 4 - 6	Small, straight watercourses with limited notable features from aerial imagery. Unnamed watercourse 4 is designated a Main River (i.e. within the remit Environment Agency) where it is crossed by the route.

Table 5.4: Initial baseline overview of Caker Stream WFD water body

Caker Stream	
Water body ID	GB106039017730
Catchment size (km^2)	89.2
Hydromorphological designation	Not designated an Artificial or Heavily Modified Water Body
Overall status	Moderate
Biological status	**Moderate**
Fish	Good
Invertebrates	Moderate

Macrophytes and phytobenthos combined	Good
Hydromorphological supporting elements	**Supports good**
Hydrological regime	Supports good
Morphology	Supports good
Physico-chemical quality element	**Moderate**
Ammonia (phys-chem)	High
Biochemical oxygen demand (BOD)	High
Dissolved oxygen	Good
pH	High
Phosphate	Moderate
Temperature	High
Mitigation measures assessment	**N/A**
Summary of watercourses within the study area	
Caker Stream	The planform of Caker Stream is largely straight and lacks a continuous or substantially vegetated riparian corridor. Agricultural fields are present immediately adjacent to the channel through much of the catchment.
Unnamed watercourses 7-14	All of the watercourses can be seen on aerial imagery and are typically artificial straight channels, with some lengths of mature trees and dense vegetation present in the riparian zone. The watercourses usually border fields used for agriculture or recreational purposes (such as golf courses).

Table 5.5: Initial baseline overview of North Wey (Alton to Tilford) WFD water body

North Wey (Alton to Tilford)	
Water body ID	GB106039017830
Catchment size (km^2)	82.5
Hydromorphological designation	Not designated an Artificial or Heavily Modified Water Body
Overall status	Moderate
Biological status	**Moderate**
Fish	Moderate

Invertebrates	High
Macrophytes and phytobenthos combined	Good
Hydromorphological supporting elements	**Supports good**
Hydrological regime	Supports good
Morphology	Supports good
Physico-chemical quality element	**Moderate**
Acid neutralising capacity	High
Ammonia (phys-chem)	High
Biochemical oxygen demand (BOD)	High
Dissolved oxygen	Moderate
pH	High
Phosphate	Poor
Temperature	High
Mitigation measures assessment	**N/A**
Summary of watercourses within the study area	
River Wey	The River Wey is a key tributary of the River Thames and has its source near Tilford. The channel typically has a meandering planform, however, the channel has been straightened and modified along its length as a result of a number of urban developments. Within the study area, the channel is culverted under a number of roads through Alton and is attenuated by two ponds. The vegetated riparian zone consists of woodland adjacent to the A31 near Alton. Downstream of Alton, the riparian vegetation is typically formed of grasses, crops and the occasional stand of large trees.
Unnamed watercourses 15 and 16	Unnamed watercourse 15 and 16 are small watercourses with some mature riparian vegetation present along the banks. Unnamed watercourse 15 has been historically straightened, whilst unnamed watercourse 16 is only present on maps from 1985 suggesting it is likely to be an artificially created channel, most likely for land drain purposes.
Unnamed watercourse 87	A small, straight watercourse that drains into Water feature 1. The watercourse is likely a land drain, with riparian vegetation largely grasses with the occasional mature tree.
Ryebridge Stream	The Ryebridge Stream is a small tributary of the River Wey, with a straight channel planform. The vegetated riparian corridor consists of mature trees and bushes along much of its length. It is crossed by the A31 immediately upstream of the confluence with the River Wey.

Water feature 1	Water feature 1 is a small (460m long) lake, situated to the west of Bentley.

Table 5.6: Initial baseline overview of Hart (Crondall to Elvetham) WFD water body

Hart (Crondall to Elvetham)	
Water body ID	GB106039017090
Catchment size (km^2)	45
Hydromorphological designation	Not designated an Artificial or Heavily Modified Water Body
Overall status	Poor
Biological status	**Poor**
Fish	Poor
Invertebrates	Good
Macrophytes and phytobenthos combined	Moderate
Hydromorphological supporting elements	**Supports good**
Hydrological regime	Does not support good
Morphology	Supports good
Physico-chemical quality element	**Moderate**
Ammonia (phys-chem)	High
Dissolved oxygen	Good
pH	High
Phosphate	Moderate
Temperature	High
Mitigation measures assessment	**N/A**
Summary of watercourses within the study area	

River Hart	The River Hart has its source at Crondall (named Ashley Head Spring on OS mapping). The channel has a straight planform and largely follows field boundaries. It is culverted at several points along its length, including beneath the Basingstoke Canal. North of the Basingstoke Canal the channel planform becomes more sinuous, although there are lengths of channel that appear to have been straightened around the M3 motorway and the London and South Western Railway line.
Unnamed watercourses 18 - 27	The majority of the watercourses are small and have straight planforms, usually with densely vegetated riparian corridors . Most of the channels are also culverted beneath roads and field tracks.

Table 5.7: Initial baseline overview of Fleet Brook WFD water body

Fleet Brook	
Water body ID	GB106039017120
Catchment size (km^2)	33.1
Hydromorphological designation	Heavily Modified Water Body
Overall status	Moderate
Biological status	**Poor**
Fish	Poor
Invertebrates	Moderate
Hydromorphological supporting elements	**Supports good**
Hydrological regime	Supports good
Physico-chemical quality element	**Moderate**
Ammonia (phys-chem)	High
Dissolved oxygen	Poor
pH	High
Phosphate	Moderate
Temperature	High

Mitigation measures assessment	Good
Summary of watercourses within the study area	
Fleet Brook	Fleet Brook appears to flow north out of Fleet Pond, which is situated to the east of Fleet. The watercourse passes beneath several roads and has been historically straightened at several locations. It has a straight planform until it flows west out of Fleet, at which point it starts to meander through agricultural land. Riparian vegetation cover is varied, with large trees and mature vegetation present along some stretches and grasses and crops along others.
Unnamed watercourses 28 - 32 and 35	Straight watercourses found to the south and east of Fleet. Unnamed watercourse 28 - 32 feed into Gelvert Stream.
Gelvert Stream	Gelvert Stream has a straight channel planform and flows through a series of woodlands to the south and east of Fleet. It enters Fleet Pond (a large lake) on the outskirts of Fleet.

Table 5.8: Initial baseline overview of Cove Brook WFD water body

Cove Brook	
Water body ID	GB106039017130
Catchment size (km^2)	22.8
Hydromorphological designation	Not designated as Artificial or Heavily Modified Water Body
Overall status	Bad
Biological status	**Bad**
Fish	Moderate
Invertebrates	Bad
Hydromorphological supporting elements	**Supports good**
Hydrological regime	Supports good
Physico-chemical quality element	**Moderate**
Acid neutralising capacity	High
Ammonia (phys-chem)	High

Dissolved oxygen	Poor
pH	High
Phosphate	Good
Temperature	High
Mitigation measures assessment	**N/A**
Summary of watercourses within the study area	
Cove Brook	Cove Brook has its source beneath Farnborough Airport. The watercourse then flows north through the town of Farnborough. The planform throughout the catchment is predominantly straight. Channel straightening and realignment has been carried out at various points since the earliest mapping in 1888. The vegetated riparian corridor comprises of large trees and mature vegetation south of the London and South Western Railway line. North of the railway, grasses become increasingly common.
Unnamed watercourses 33, 34, 38 and 39	Unnamed watercourses 33, 34 ,38 and 39 are all small drainage channels, with some established riparian vegetation.
Unnamed watercourses 36 and Ively Brook	Unnamed watercourse 36 and Ively Brook are tributaries of Cove Brook. The channels pass through golf courses, with the vegetated riparian corridor dominated by manicured grasses.
Water feature 2	Water feature 2 is formed of two small (50m long) ponds situated south-west of Farnborough.

Table 5.9: Initial baseline overview of Blackwater (Aldershot to Cove Brook at Hawley) WFD water body

Blackwater (Aldershot to Cove Brook confluence at Hawley)	
Water body ID	GB106039017180
Catchment size (km^2)	63
Hydromorphological designation	Not designated as Artificial or Heavily Modified Water Body
Overall status	Poor
Biological status	**Poor**
Fish	Poor
Invertebrates	Moderate

Macrophytes and phytobenthos combined	Moderate
Hydromorphological supporting elements	**Supports good**
Hydrological regime	Supports good
Physico-chemical quality element	**Moderate**
Acid neutralising capacity	High
Ammonia (phys-chem)	Moderate
Biochemical oxygen demand (BOD)	High
Dissolved oxygen	Bad
pH	High
Phosphate	Poor
Temperature	High
Mitigation measures assessment	**N/A**
Summary of watercourses within the study area	
River Blackwater	The River Blackwater has its source to the south-west of Aldershot. It flows through predominantly urban areas and has been extensively straightened and realigned, notably through Farnborough and around the M3 motorway.
Unnamed watercourses 42 and 46-47	Unnamed watercourse 42 and 47 appear to be straight and narrow artificial channels, with densely vegetated riparian corridors. Unnamed watercourse 46 is culverted for the majority of its length.
Unnamed watercourse 44 and 45	Unnamed watercourse 44 flows through woodland from its source on a golf course east of Frimley, before being culverted beneath parts of Frimley. The planform of the channel is predominantly straight. It is fed by Unnamed watercourse 45, which is a small straight channel.
Unnamed watercourse 84	Unnamed watercourse 84 appears to be a short section of road drain, running parallel to a road through Frimley Hatches and is approximately 100m long. Riparian vegetation cover, comprising of mature trees, is extensive.
Water feature 3 and The Hatches	A collection of large lakes that are present on historical mapping after 1961. Analysis of historical maps suggest these are former gravel abstraction pits.

Table 5.10: Initial baseline overview of Hale/Mill Bourne (Bagshot to Addlestone Bourne confluence near Chobham) WFD water body

Hale/Mill Bourne (Bagshot to Addlestone Bourne confluence near Chobham)	
Water body ID	GB106039017930
Catchment size (km^2)	45.3
Hydromorphological designation	Not designated as Artificial or Heavily Modified Water Body
Overall status	Moderate
Biological status	**Moderate**
Fish	Moderate
Invertebrates	Good
Macrophytes and phytobenthos combined	Good
Hydromorphological supporting elements	**Supports Good**
Hydrological regime	Supports good
Morphology	Supports good
Physico-chemical quality element	**Moderate**
Acid neutralising capacity	High
Ammonia (phys-chem)	Moderate
Dissolved oxygen	Good
pH	High
Phosphate	Poor
Temperature	High
Mitigation measures assessment	**N/A**
Summary of watercourses within the study area	
Hale/Mill Bourne	The watercourse has its source on Surrey Hill, to the north-west of Bagshot, where a number of watercourses coalesce to form a small pond from which a single watercourse issues. The watercourse planform is predominantly straight and is culverted at several locations through

	Bagshot. To the east of Bagshot, the channel planform becomes more sinuous, with little evidence of historical modifications, aside from a couple of exceptions including a diversion at the M3 crossing. Large trees and mature vegetation are present along the channel bank tops. Land use adjacent to the watercourse is predominantly pastoral agriculture.
Unnamed watercourses 49-59	All the unnamed watercourses are either land or drainage ditches. Aerial imagery suggests that the channels are typically culverted beneath the roads/settlements. The vegetated riparian corridors are formed of a mixture of grasses, shrubs and some trees.
Clappers Brook	The watercourse has its source east of Windlesham. It has a largely straight planform with a narrow, but largely continuous vegetated riparian corridor consisting of mature established vegetation.

Table 5.11: Initial baseline overview of Chertsey Bourne (Virginia Water to Chertsey) WFD water body

Chertsey Bourne (Virginia Water to Chertsey)	
Water body ID	GB106039017070
Catchment size (km^2)	34.4
Hydromorphological designation	Heavily Modified Water Body
Overall status	Moderate
Biological status	**Bad**
Fish	Bad
Invertebrates	Good
Hydromorphological Supporting Elements	**Supports good**
Hydrological regime	Supports good
Physico-chemical quality element	**Moderate**
Ammonia (phys-chem)	High
Dissolved oxygen	Moderate
pH	High
Phosphate	Good
Temperature	High

Mitigation measures assessment	Moderate or less
Summary of watercourses within the study area	
Chertsey Bourne	The Chertsey Bourne has its source from Virginia Water in the north-west of the catchment. The channel then flows south-east through Wentworth Golf Course and into Wentworth Pond. From here it flows through Virginia Wood and typically has a sinuous channel planform. The channel appears to have been straightened and realigned around Junction 2 of the M3 motorway. The watercourse passes through woodland to the west of the M3, and the mature trees and shrubs continue downstream in a narrower continuous corridor along the channel banks.
Unnamed watercourses 60 - 63	The unnamed watercourses are all located within Foxhills Golf Course, south-west of Lyne. They are generally straight and incised, with narrow vegetated riparian corridors consisting of mature vegetation.

Table 5.12: Initial baseline overview of Chertsey Bourne (Chertsey to River Thames confluence) WFD water body

Chertsey Bourne (Chertsey to River Thames confluence)	
Water body ID	GB106039017030
Catchment size (km^2)	12.2
Hydromorphological designation	Not designated as Artificial or Heavily Modified Water Body
Overall status	Poor
Biological status	**Poor**
Fish	Poor
Invertebrates	High
Macrophytes and phytobenthos combined	Moderate
Hydromorphological supporting elements	**Supports good**
Hydrological regime	Supports good
Physico-chemical quality element	**Moderate**
Ammonia (phys-chem)	High
Dissolved oxygen	Moderate

pH	High
Phosphate	Poor
Temperature	High
Mitigation measures assessment	**N/A**
Summary of watercourses within the study area	
Chertsey Bourne	The Chertsey Bourne within the Chertsey Bourne (Chertsey to River Thames confluence) WFD water body catchment flows south-east through Chertsey. The channel planform is generally straight, although there are some stable meanders. The watercourse passes through predominantly urban areas, with the vegetated riparian corridor consisting of a mixture of grasses and semi-continuous stands of mature trees and shrubs.
Unnamed watercourses 64 and 65	Unnamed watercourses 64 and 65 are all located within Foxhills Golf Course, south-west of Lyne. They are generally straight and incised, with narrow corridors of mature riparian vegetation.
Unnamed watercourses 66 and 67	Unnamed watercourses 66 and 67 are assumed to be small ponds (not visible from aerial imagery).
Unnamed watercourses 68 – 75, 77, 82 and 83	A series of field drains, running along the edge of field boundaries. All watercourses typically have a straight channel planform, with narrow vegetated riparian corridors of mature trees and shrubs.
Unnamed watercourse 76	Unnamed watercourse 76 is fed by Unnamed watercourses 68-75, 82 and 83, and in turn feeds into The Bourne. It passes through Abbey Moor Golf Course and is then culverted beneath parts of Addlestone Moor.

Table 5.13: Initial baseline overview of Thames (Egham to Teddington) WFD water body

Thames (Egham to Teddington)	
Water body ID	GB106039023232
Catchment size (km^2)	44.8
Hydromorphological designation	Heavily Modified Water Body
Overall status	Poor
Biological status	**Poor**

Invertebrates	Good
Macrophytes and phytobenthos combined	Poor
Hydromorphological supporting elements	**Not assessed**
Physico-chemical quality element	**Moderate**
Acid neutralising capacity	High
Ammonia (phys-chem)	High
Biochemical Oxygen Demand (BOD)	Good
Dissolved oxygen	Good
pH	High
Phosphate	Moderate
Temperature	Moderate
Mitigation measures assessment	**Moderate or less**
Summary of watercourses within the study area	
River Thames	The River Thames has its source in Gloustershire and flows through several large urban areas including Oxford, Reading, Henley-on-Thames, Windsor and London. The river drains into the North Sea via the Thames Esturay east of London. The river has a meandering channel planform; however, it has historically been heavily modified as a result of industry, urbanisation and agriculture.
Water feature 5	Water feature 5 is a small rectangular lake (measuring approximately 130m in length).
Unnamed watercourse 78	A land drain with a straight channel planform that follows an agricultural field boundary.

Table 5.14: Initial baseline overview of Surrey Ash WFD water body

Surrey Ash	
Water body ID	GB106039023480
Catchment size (km^2)	19
Hydromorphological designation	Heavily Modified Water Body
Overall status	Moderate
Biological status	**Good**
Fish	Good
Invertebrates	Good
Hydromorphological supporting elements	**Supports good**
Hydrological regime	Supports good
Physico-chemical quality element	**Moderate**
Ammonia (phys-chem)	High
Dissolved oxygen	Good
pH	High
Phosphate	Moderate
Temperature	High
Mitigation measures assessment	**Moderate or less**
Summary of watercourses within the study area	
River Ash	The River Ash is a tributary of the River Colne. The channel planform is typically straight, although some lengths of channel exhibit some sinuosity (particularly near Shepperton and Littleton). Significant channel realignment has been undertaken to accommodate the construction of Queen Mary Reservoir near Littleton. The vegetated riparian corridor along the channel typically consists of large trees, mature vegetation and grasses.
Unnamed watercourse 79 - 81	These watercourses are straight land and road drainage ditches. The vegetated riparian corridor consists mostly of grasses, with some large trees and mature vegetation.

Unnamed watercourse 85	Unnamed watercourse 85 is classified as a Main River and is a tributary of the River Ash, which it joins approximately 1km north-west of Queen Mary Reservoir. The watercourse appears to have been extensively modified, having been straightened and culverted along much of its length.
Intake channel	An intake channel for the Queen Mary Reservoir from the River Thames. The watercourse is artificial and has a straight rectangular channel. The banks are low and vertical, beyond which the surrounding land has been graded to provide a two stage cross-section.
King George VI Reservoir water transfer	The channel runs between Staines-upon-Thames and Sunbury-on-Thames. The aqueduct is an artificial watercourse with a straight rectangular channel and vertical banks. The watercourse is crossed by a number of roads and railways, and is culverted beneath Shortwood Common Leacroft.

5.2 WFD Groundwater Bodies

5.2.1 Table 5.15 to Table 5.24 provide an overview of the 10 WFD groundwater bodies that have been scoped in for further assessment in Stage 3 as part of the WFD Assessment.

Table 5.15: Initial baseline overview of South East Hants Bracklesham Group WFD groundwater body

South East Hants Bracklesham Group	
Water body ID	GB40702G503000
Catchment size (km^2)	146.2
Overall status	Poor
Quantitative status	**Good**
Quantitative dependent surface water body status	Good
Quantitative GWDTEs test	Good
Quantitative saline intrusion	Good
Quantitative water balance	Good
Chemical (GW) status (qualitative)	**Poor**
Chemical dependent surface water body status	Poor
Chemical drinking water protected area	Poor
Chemical GWDTEs test	Good
Chemical saline intrusion	Good
General chemical test	Good

Table 5.16: Initial baseline overview of East Hants Lambeth Group WFD groundwater body

East Hants Lambeth Group	
Water body ID	GB40702G500800
Catchment size (km^2)	24.9
Overall status	Poor
Quantitative status	Poor
Quantitative dependent surface water body status	Poor
Quantitative GWDTEs test	Good
Quantitative saline intrusion	Good
Quantitative water balance	Good
Chemical (GW) status (qualitative)	Good
Chemical dependent surface water body status	Good
Chemical drinking water protected area	Good
Chemical GWDTEs test	Good
Chemical saline intrusion	Good
General chemical test	Good

Table 5.17: Initial baseline overview of East Hants Chalk WFD groundwater body

East Hants Chalk	
Water body ID	GB40701G502700
Catchment size (km^2)	265.6
Overall status	Poor
Quantitative status	Poor
Quantitative dependent surface water body status	Poor
Quantitative GWDTEs test	Good
Quantitative saline intrusion	Good
Quantitative water balance	Poor
Chemical (GW) status (qualitative)	Poor
Chemical dependent surface water body status	Good
Chemical drinking water protected area	Poor
Chemical GWDTEs test	Good
Chemical saline intrusion	Good
General chemical test	Poor

Table 5.18: Initial baseline overview of River Itchen Chalk WFD groundwater body

River Itchen Chalk	
Water body ID	GB40701G505000
Catchment size (km^2)	453.4
Overall status	Poor
Quantitative status	Poor
Quantitative dependent surface water body status	Poor
Quantitative GWDTEs test	Good
Quantitative saline intrusion	Good
Quantitative water balance	Poor
Chemical (GW) status (qualitative)	Poor
Chemical dependent surface water body status	Good
Chemical drinking water protected area	Poor
Chemical GWDTEs test	Good
Chemical saline intrusion	Good
General chemical test	Poor

Table 5.19: Initial baseline overview of Alton Chalk WFD groundwater body

Alton Chalk	
Water body ID	GB40601G604400
Catchment size (km^2)	93.6
Overall status	Good
Quantitative status	Good
Quantitative dependent surface water body status	Good
Quantitative GWDTEs test	Good
Quantitative saline intrusion	Good
Quantitative water balance	Good
Chemical (GW) status (qualitative)	Good
Chemical dependent surface water body status	Good
Chemical drinking water protected area	Good
Chemical GWDTEs test	Good
Chemical saline intrusion	Good
General chemical test	Good

Table 5.20: Initial baseline overview of Basingstoke Chalk WFD groundwater body

Basingstoke Chalk	
Water body ID	GB40601G501300
Catchment size (km^2)	159.4
Overall status	Poor
Quantitative status	Poor
Quantitative dependent surface water body status	Poor
Quantitative GWDTEs test	Poor
Quantitative saline intrusion	Good
Quantitative water balance	Poor
Chemical (GW) status (qualitative)	Poor
Chemical dependent surface water body status	Good
Chemical drinking water protected area	Poor
Chemical GWDTEs test	Good
Chemical saline intrusion	Good
General chemical test	Poor

Table 5.21: Initial baseline overview of Old Basing Tertiaries WFD groundwater body

Old Basing Tertiaries	
Water body ID	GB40602G601700
Catchment size (km^2)	10.9
Overall status	Poor
Quantitative status	Poor
Quantitative dependent surface water body status	Good
Quantitative GWDTEs test	Poor
Quantitative saline intrusion	Good
Quantitative water balance	Good
Chemical (GW) status (qualitative)	Good
Chemical dependent surface water body status	Good
Chemical drinking water protected area	Good
Chemical GWDTEs test	Good
Chemical saline intrusion	Good
General chemical test	Good

Table 5.22: Initial baseline overview of Farnborough Bagshot Beds WFD groundwater body

Farnborough Bagshot Beds	
Water body ID	GB40602G601300
Catchment size (km^2)	233
Overall status	Good
Quantitative status	Good
Quantitative dependent surface water body status	Good
Quantitative GWDTEs test	Good
Quantitative saline intrusion	Good
Quantitative water balance	Good
Chemical (GW) status (qualitative)	Good
Chemical dependent surface water body status	Good
Chemical drinking water protected area	Good
Chemical GWDTEs test	Good
Chemical saline intrusion	Good
General chemical test	Good

Table 5.23: Initial baseline overview of Chobham Bagshot Beds WFD groundwater body

Chobham Bagshot Beds	
Water body ID	GB40602G601400
Catchment size (km^2)	355.6
Overall status	Good
Quantitative status	Good
Quantitative dependent surface water body status	Good
Quantitative GWDTEs test	Good
Quantitative saline intrusion	Good
Quantitative water balance	Good
Chemical (GW) status (qualitative)	Good
Chemical dependent surface water body status	Good
Chemical drinking water protected area	Good
Chemical GWDTEs test	Good
Chemical saline intrusion	Good
General chemical test	Good

Table 5.24: Initial baseline overview of Lower Thames Gravels WFD groundwater body

Lower Thames Gravels	
Water body ID	GB40603G000300
Catchment size (km^2)	269.9
Overall status	Good
Quantitative status	Good
Quantitative dependent surface water body status	Good
Quantitative GWDTEs test	Good
Quantitative saline intrusion	Good
Quantitative water balance	Good
Chemical (GW) status (qualitative)	Good
Chemical dependent surface water body status	Good
Chemical drinking water protected area	Good
Chemical GWDTEs test	Good
Chemical saline intrusion	Good
General chemical test	Good

5.3 Potential Impacts

5.3.1 This section aims to provide an overview of the potential impacts of the Project on the WFD water bodies. Table 5.25 lists the pressures, potential impacts and what potential mitigation measures may entail. This is based on previously issued UKTAG guidance[1] for the Project along the WFD water bodies.

Table 5.25: Pressures, potential impacts and associated mitigation measures for works to water body

Pressure	Sub-pressure	Potential impacts	Potential mitigation measures
Construction.	Pipeline crossings (open cut and trenchless).	Loss of riparian zone and in-channel habitat, increased sediment input, changes in flow and sediment dynamics, decreased stability of banks, changes in depth and width.	Manage and restore riparian habitats, promote flow and geomorphological diversity, replicate existing conditions, good practice sediment management.

[1] UKTAG (United Kingdom Technical Advisory Guide), 2008, *Guidance on the Classification of Ecological Potential for Heavily Modified Water Bodies and Artificial Water Bodies*. Accessed 12/04/2018.

Pressure	Sub-pressure	Potential impacts	Potential mitigation measures
Bank and bed reinforcement and in-channel structures.	Hard protection e.g. sheet piling, vertical walls and gabion baskets. Includes hard bank protection in a state of disrepair.	Loss of riparian zone/marginal habitat/ loss of lateral connectivity/loss of sediment input.	Removal of hard bank reinforcement/revetment or replacement with soft engineering solution.
			Protect and enhance ecological value of marginal aquatic habitat, banks and riparian zone.
			Protect and restore historic aquatic habitats.
		Loss of sediment continuity (lateral) – build-up of sediment in the channel.	Removal of hard bank reinforcement/revetment or replacement with soft engineering solution.
			Protect and enhance ecological value of marginal aquatic habitat, banks and riparian zone.
			Protect and restore historic aquatic habitats.
Operations and maintenance.	Deposition of excavated material.	Smothering of existing habitats, mobilisation of contaminants, increased turbidity.	Good practice sediment management.

5.3.2 Table 5.26 outlines how the pipeline construction and crossing of watercourses can impact on WFD quality elements for surface water bodies.

Table 5.26: Potential effects of the pipeline construction on WFD quality elements for surface water bodies

Biological quality elements	
Composition and abundance of aquatic flora	**Open cut** Loss of in-channel and riparian habitat during construction. Potential for local loss of vegetation during operation. **Trenchless** No impact to the watercourse channel.
Composition and abundance of benthic invertebrate fauna	**Open cut** Disturbance of the channel bed during construction phase, removing habitat and bed substrate. Potential for a change in channel cross-section and bed material during operation following reinstatement.

	Trenchless No impact to the watercourse channel.
Composition, abundance and age of structure of fish fauna	**Open cut** Loss of in-channel and riparian habitat during construction. Potential for localised mortality and disruption to migratory pathways during dewatering. No impact at the water body scale. **Trenchless** Potential for noise and vibration to influence behavioural activity of fish in the vicinity of crossing points. Likely to be short term.
Physico-chemical quality elements	
Thermal conditions	**Open Cut and Trenchless** Localised changes to channel shading during construction phase. No impact at the water body scale.
Oxygenation conditions	**Open cut** Re-suspension of material during open cut crossings has the potential to reduce oxygenation in the watercourse. This would be localised and not cause an impact at the water body scale. **Trenchless** No impact at the water body scale.
Salinity	**Open cut and trenchless** No impact at the water body scale.
Acidification status	**Open cut and trenchless** No impact at the water body scale.
Nutrient conditions	**Open cut** In-channel working and disturbance of surrounding land could increase nutrient levels in the watercourses if pathways are created to the watercourse. Impacts likely to be minor and localised. No impact at the water body scale. **Trenchless** No impact at the water body scale.
Hydromorphological quality elements	
Quantity and dynamics of water flow	**Open cut and trenchless** Removal of riparian vegetation could increase surface water runoff rates and change flow processes during high rainfall and flood events. There should be no impact at the water body scale. For open-cut crossings, in-channel working would lead to localised changes in flow processes during the construction phase. Where the bed and banks are reinstated during the operational phase, there could be localised changes to the flow processes.

Connection to groundwater bodies	**Open cut** Installation of the pipeline would locally impact groundwater connectivity at the crossing location. **Trenchless** Drilling through the groundwater pathways and installation of the pipeline could locally impact groundwater connectivity.
River continuity	**Open cut** During construction, longitudinal connectivity of the watercourse may be impacted as a result of the trench required for open-cut crossings and the presence of a semi-permanent haul road. Lateral connectivity could also be locally altered during construction as a result of a disturbance of the channel banks and the removal of riparian vegetation. During operation there are not anticipated to be any long-term changes in the longitudinal and lateral connectivity, if the channel and riparian corridor are reinstated. However, there is the potential for erosion to occur where the channel has been reinstated which could locally alter the connectivity. **Trenchless** There would be no impact to longitudinal connectivity. Removing part of the riparian corridor, where required for enabling works, could impact lateral connectivity. This is unlikely have a significant impact. Following re-establishment of vegetation in the floodplain, it is expected that there would be little deviation from the current state.
River depth and width variation	**Open cut** Bank instability from sediment removal could impact river width and depth locally. A weak point could be created at the location of fill where the channel has been reinstated, potentially encouraging erosion leading to local variations in the river depth and width. **Trenchless** No effect on quality element.
Structure and substrate of the river bed	**Open cut** Exposed earth within the construction working corridor during the open cut crossings could increase fine sediment delivery to the watercourse. The structure and substrate of the existing channel bed could also be locally impacted by the construction of the semi-permanent haul roads and following the re-instatement of the channel after pipe installation. **Trenchless** No impact on quality element.
Structure of the riparian zone	**Open cut** Partial removal of the riparian corridor during construction.

	Trenchless Potential for impacts on the vegetation within the riparian zone for enabling works.

5.3.3 Table 5.27 outlines how the pipeline construction and crossing of watercourses can impact on WFD quality elements for groundwater bodies

Table 5.27: Potential effects of the pipeline construction on WFD quality elements for groundwater bodies

Quantitative elements	
Groundwater dependent terrestrial ecosystems	**Open cut** Open cut trenches have the potential to intercept very shallow groundwater that would otherwise discharge to a GWDTE, causing reduction in the volume of groundwater input to the GWDTE. **Trenchless** Dewatering required for construction of shafts for trenchless crossings could cause a temporary reduction of groundwater levels and/or flows into a GWDTE. Mobilisation of suspended solids below the water table could lead to migration of sediment to a GWDTE via fracture flow and spring discharges.
Saline intrusion	**Open cut** Given the distance of the works from the coast, and that inland no saline groundwater bodies have been identified, there will be no saline intrusion. **Trenchless** Given the distance of the works from the coast, and that inland no saline groundwater bodies have been identified, there will be no saline intrusion.
Water balance	**Open cut** Removal of vegetation and shallow soils has the potential to alter recharge characteristics. However, given the area of works compared to the area available for recharge of the groundwater bodies and the temporary nature of these works, there would be no impact at the groundwater body scale. **Trenchless** Only small areas of ground will be required for trenchless crossings and there would be no impact at the groundwater body scale from changes to groundwater recharge from this. Groundwater abstraction required for construction of shafts for the trenchless crossings would be short term and on a local scale and there would be no impact at the groundwater body scale.

Chemical (qualitative) elements	
Chemical drinking water protected area	**Open cut** Changes to groundwater quality from the removal of vegetation and disturbance of shallow ground could lead to increased suspended solid concentrations in the underlying groundwater. In fractured aquifers such as the Chalk, suspended solids could migrate to groundwater abstractions. **Trenchless** Disturbance of ground beneath the water table could lead to increased suspended solids content in groundwater, which in fractured aquifers such as the Chalk could migrate to groundwater abstractions.
Chemical groundwater dependent ecosystems	**Open cut** Changes to groundwater quality from the removal of vegetation and disturbance of shallow ground could lead to increased suspended solid concentrations in the underlying groundwater. In fractured aquifers such as the Chalk, suspended solids could migrate to spring discharge points associated with GWDTE leading to an input of sediment to the GWDTE. **Trenchless** Disturbance of ground beneath the water table could lead to increased suspended solids content in groundwater, which in fractured aquifers such as the Chalk could migrate to spring discharge points associated with GWDTE leading to an input of sediment to the GWDTE.
Chemical saline intrusion	**Open cut** Given the distance of the works from the coast, and that inland no saline groundwater bodies have been identified, there will be no saline intrusion. **Trenchless** Given the distance of the works from the coast, and that inland no saline groundwater bodies have been identified, there will be no saline intrusion.
General assessment of quality of the groundwater body as a whole	**Open cut** Removal of vegetation and shallow soils has the potential to alter recharge characteristics and mobilise contaminants and suspended solids. However, given the relatively small area of works compared to the area of the groundwater bodies and the temporary nature of these works, there would be no impact at the groundwater body scale. **Trenchless** Disturbance of ground beneath the water table could mobilise contaminants and suspended solids. However, given the relatively small area of works compared to the area of the groundwater bodies and the temporary nature of these works, there would be no impact at the groundwater body scale.

5.4 Potential Mitigation Measures

5.4.1 Based on the potential impacts outlined in Table 5.25, Table 5.26 and Table 5.27, initial measures to mitigate the potential impacts arising from the construction and operational activities of the Project have been identified. These mitigation measures will be further developed to offer more specific mitigation relevant to potential impacts as more detail of the design and construction corridor become available.

5.4.2 The CEMP will set out the water mitigation and management measures and where they will need to be used. These measures will include, but not be restricted to, the following:

- details of where and when de-watering is likely to be required;
- measures to segregate construction site runoff from natural catchment runoff;
- the location and design of any holding or settlement lagoons or other treatment system required prior to discharge to the environment;
- the location of any known land drainage systems likely to be impacted, the design for header drains and the location of any discharge points;
- details of mitigation measures for all work or compound areas located within flood risk areas;
- construction activities to be located outside of the floodplain as much as possible (i.e. avoid stockpiling materials in the floodplain);
- where necessary, measures to mitigate for any flood waters displaced during temporary construction works may be required. This could include measures such as raised storage areas, cabins etc.;
- attenuation of increased runoff rates prior to discharge at controlled rates to receiving watercourses; and
- details of any water abstraction and discharge points relating to the hydrostatic testing of the pipeline.

6. References

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Appendix A. List of Watercourses and Water Features

A1.1 Table A.1 provides an overview of the watercourses and water features .crossed by the Project. The grid references provided give an indicative location of the receptor in relation to the Project.

Table A.1: Overview of watercourses and water features

Watercourse name	X	Y	Feature Type
Unnamed watercourse 1	451021	114061	Ordinary Watercourse
Ford Lake	451564	114719	Main River
Unnamed watercourse 2	452298	116360	Ordinary Watercourse
Unnamed watercourse 5	453569	117989	Ordinary Watercourse
Unnamed watercourse 6	453748	118308	Ordinary Watercourse
Unnamed watercourse 8	471430	136478	Ordinary Watercourse
Unnamed watercourse 9	471593	136945	Ordinary Watercourse
Unnamed watercourse 10	472139	137589	Ordinary Watercourse
Caker Stream	472570	137805	Main River
Unnamed watercourse 11	472872	137866	Ordinary Watercourse
Water Lane	472959	138418	Ordinary Watercourse
Unnamed watercourse 12	473043	138583	Ordinary Watercourse
Unnamed watercourse 13	473290	138656	Ordinary Watercourse
Unnamed watercourse 14	473250	138883	Ordinary Watercourse
Unnamed watercourse 15	474639	140624	Ordinary Watercourse
River Wey	474760	141392	Main River
Unnamed watercourse 16	475185	142047	Ordinary Watercourse
Ryebridge Stream	476062	142971	Ordinary Watercourse
Water feature 1	477042	144144	Lake
Unnamed watercourse 17	477744	145225	Ordinary Watercourse
Unnamed watercourse 18	480505	148630	Ordinary Watercourse
Unnamed watercourse 19	480544	148876	Ordinary Watercourse
Unnamed watercourse 20	480648	149321	Ordinary Watercourse
Unnamed watercourse 22	480637	149545	Ordinary Watercourse
Unnamed watercourse 23	480617	149671	Ordinary Watercourse
Unnamed watercourse 24	480768	150066	Ordinary Watercourse
Unnamed watercourse 25	481062	150298	Ordinary Watercourse
Unnamed watercourse 26	481384	150629	Ordinary Watercourse

Watercourse name	X	Y	Feature Type
Unnamed watercourse 27	481398	150674	Ordinary Watercourse
Unnamed watercourse 28	481746	151222	Ordinary Watercourse
Unnamed watercourse 29	482009	151488	Ordinary Watercourse
Unnamed watercourse 30	482168	151570	Ordinary Watercourse
Unnamed watercourse 31	482843	152914	Ordinary Watercourse
Unnamed watercourse 32	482965	153087	Ordinary Watercourse
Gelvert Stream	483007	153129	Main River
Basingstoke Canal	483319	153558	Canal
Unnamed watercourse 34	484056	154095	Ordinary Watercourse
Ively Brook	485423	154832	Main River
Cove Brook	485671	155656	Main River
Unnamed watercourse 38	486482	156052	Ordinary Watercourse
River Blackwater	487788	156940	Main River
Water feature 3	487722	156871	Lake
The Hatches	487879	157014	Lake
Unnamed watercourse 42	488040	157168	Ordinary Watercourse
Unnamed watercourse 44	488953	157758	Main River
Unnamed watercourse 45	490272	159118	Ordinary Watercourse
Unnamed watercourse 46	490325	158172	Ordinary Watercourse
Unnamed watercourse 47	490778	158332	Ordinary Watercourse
Unnamed watercourse 48	491196	160955	Ordinary Watercourse
Unnamed watercourse 49	492996	161596	Ordinary Watercourse
Unnamed watercourse 50	493990	161717	Ordinary Watercourse
Unnamed watercourse 51	494096	161843	Ordinary Watercourse
Hale Bourne	494393	162036	Main River
Unnamed watercourse 53	494670	162263	Ordinary Watercourse
Clappers Brook	495634	162599	Ordinary Watercourse
Unnamed watercourse 55	495971	162670	Ordinary Watercourse
Unnamed watercourse 56	496989	163352	Ordinary Watercourse
Unnamed watercourse 57	497874	164144	Main River
Chobham Park Brook	498884	162764	Main River
Unnamed watercourse 58	499822	163475	Ordinary Watercourse
Unnamed watercourse 59	498949	164584	Ordinary Watercourse

Watercourse name	X	Y	Feature Type
Unnamed watercourse 60	499983	165182	Ordinary Watercourse
Unnamed watercourse 61	500172	165361	Ordinary Watercourse
Unnamed watercourse 62	500216	165402	Ordinary Watercourse
Unnamed watercourse 63	500524	165444	Ordinary Watercourse
Unnamed watercourse 64	501199	165455	Ordinary Watercourse
Unnamed watercourse 65	501364	165407	Ordinary Watercourse
Unnamed watercourse 66	501852	165315	Ordinary Watercourse
Unnamed watercourse 67	502494	165698	Ordinary Watercourse
Unnamed watercourse 68	502877	165802	Ordinary Watercourse
Unnamed watercourse 69	503152	165978	Ordinary Watercourse
Unnamed watercourse 70	503616	165892	Ordinary Watercourse
Unnamed watercourse 71	503717	165892	Ordinary Watercourse
Unnamed watercourse 72	503857	165854	Ordinary Watercourse
Unnamed watercourse 73	503983	165805	Ordinary Watercourse
Unnamed watercourse 74	504123	165761	Ordinary Watercourse
Unnamed watercourse 75	504259	165740	Ordinary Watercourse
Unnamed watercourse 76	504406	165731	Ordinary Watercourse
Unnamed watercourse 77	504609	165687	Ordinary Watercourse
The Bourne	505288	166099	Main River
River Thames	505585	166365	Main River
Water feature 5	505896	166944	Lake
Unnamed watercourse 78	506220	167818	Ordinary Watercourse
River Ash	505809	171290	Main River
Unnamed watercourse 79	506071	169257	Ordinary Watercourse
Intake Channel	506076	169585	Ordinary Watercourse
King George VI Reservoir water transfer (formerly Staines Reservoir Aqueduct)	506288	170691	Canal
Unnamed watercourse 80	50369	169666	Ordinary Watercourse
Unnamed watercourse 81	506016	170999	Ordinary Watercourse
Unnamed watercourse 83	504657	165629	Ordinary Watercourse
Unnamed watercourse 84	488031	156730	Ordinary Watercourse
Unnamed watercourse 85	506062	171676	Main River
Unnamed watercourse 87	477014	144153	Ordinary Watercourse

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Appendix 5.2
Flood Risk Data

Scoping Report Volume 1

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A5.2 Flood Risk Data

A5.2.1 This Appendix presents the flood risk data available to the Project at the time the Scoping Report was prepared and submitted.

A5.2.2 The Figures presented in this Appendix are provided to ensure transparency in the assessment of flood risk in the Scoping Report when determining which areas of the Order Limits are to be scoped in or out of the Environmental Impact Assessment (EIA).

A5.2.3 Figure A5.2 Sheets 1-14 have been compiled from the following datasets (original sources of the data provided in brackets):

- Detailed River Network (geospatial data available from the UK Government open data website);
- Environment Agency 'Flood Map for Planning' (geospatial data available from the UK Government open data website);
- Risk of Flooding from Surface Water (RoFSW) mapping (geospatial data available from Government open data website);
- Environment Agency 'Risk of Flooding from Reservoirs' (geospatial data available from the UK Government open data website);
- British Geological Survey Groundwater Flooding Susceptibility (geospatial data available from the UK Government open data website); and,
- Ordnance Survey 1:25,000 Explorer series mapping (Ordnance Survey under license AL100005237).

A5.2.4 Data presented in these figures have been used in the development of Figure 8.11 of the Scoping Report (Flood Risk Sensitivity), which illustrates those areas of the Order Limits to be scoped into or out of the EIA.

A5.2.5 Additional data is awaited from regulators, to enable a comprehensive assessment of sensitivity to be completed. This includes:

- Risk of flooding from reservoirs: flood depths – requested from the Environment Agency; and,
- Extents of Flood Zone 3B.

A5.2.6 On receipt of the outstanding data the assessment of areas scoped into and out of the EIA will be reviewed and updated for project design and the ES.

Appendix 6
Historic Environment Baseline Tables

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6. Table of Heritage Assets

6.1 T able 1 Undesignated Cultural Heritage Assets

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
2	57414	Archaeological Remains	Plough Marks	Negligible	450844	113831
3	59063	Archaeological Remains	Site of Toll House and Toll Gate	Low	450917	113799
5	67656	Archaeological Remains	Boorley Green Sport Pitches	Negligible	451042	114522
6	57415	Archaeological Remains	Brick Lined Well	Negligible	451108	114093
7	58169	Archaeological Remains	Prehistoric Burnt Flint Scatter	Negligible	451118	114201
9	69726	Archaeological Remains	Uplands Farm Geophysical Survey	Low	451171	113862
10	58170	Archaeological Remains	Prehistoric Flints and Multi-Period Pottery Sherds	Negligible	451190	114318
16	38904	Archaeological Remains	Surface Scatter	Negligible	451250	113730
17	57416	Archaeological Remains	Hollow Way	Low	451252	114478
20	17969	Archaeological Remains	Roman Kiln	Low	451280	115070
36	MWC7714	Archaeological Remains	Port-medieval Quarries or Extractive Pits, South of Hill Farm, Durley	Negligible	451456	115021
38	MWC4540	Archaeological Remains	Hill Farm	Low	451468	115242

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
40	59055	Archaeological Remains	Post Medieval Quarry	Negligible	451540	114204
41	42365	Archaeological Remains	Maddoxford Farm	Low	451566	114440
42	42357	Historic Building	Maddoxford Farmhouse	Low	451569	114418
45	42362	Historic Building	Granary 20m North East of Maddoxford Farmhouse	Low	451591	114444
46	42361	Historic Building	Loose Box 15m East North East of Maddoxford Farmhouse	Low	451593	114436
47	42359	Historic Building	Michael House	Low	451594	114425
48	42358	Historic Building	Cartshed 25m East South East of Maddoxford Farmhouse	Low	451601	114406
50	38733	Archaeological Remains	Medieval Farmstead, Possible Mill, Maddoxford Farm	Low	451632	114427
52	MWC1901	Historic Building	The Fish House, Kytes Lane	Low	451860	116250
55	MWC1908	Historic Building	Findens Farm, Kytes Lane	Low	452001	116395
57	MWC1904	Historic Building	Brown Heath, Gregory Lane	Low	452227	115986
64	MWC1915	Archaeological Remains	Durley Manor Farm	Low	452770	117130
65	MWC7609	Archaeological Remains	Ditched Enclosure 275m South of Durley Manor Farm	Medium	452870	116888
66	MWC1916	Historic Building	The Manor Cottage, The Drove, Manor Road	Low	452980	117500
67	MWC7720	Archaeological Remains	Curvilinear Enclosure East of Manor Farm Cottages, Durley	Low	453326	117417
68	MWC340	Historic Building	Wintershill Farm	Low	453504	118223
70	MWC5096	Historic Building	Toll House on A333	Low	453900	118200
71	MWC9	Archaeological Remains	Site of Ploughed Out Disc Barrow, West of Park Farm	Low	454000	118550
74	MWC13	Archaeological Remains	Former Quarry 675m North West of Peak cottage	Negligible	454510	119900

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
81	MWC1959	Archaeological Remains	Complex System of Enclosures and Tracks South West of Lomer Farm	Low	455189	111542
83	MWC7719	Archaeological Remains	Remnants of a Medieval or Later Field System South of Durley Street	Negligible	455336	111676
85	MWC7608	Archaeological Remains	Artefact Spread 530m West of Cross Lanes Farm	Negligible	455392	111878
86	MWC7607	Archaeological Remains	Domestic Site 980m West of Street End Farm	Medium	455451	111987
89	MWC7666	Archaeological Remains	Prehistoric and Roman enclosures, Field Systems and Trackways North East of Betty Mundy's Cottage, Exton	Low	455840	112221
90	MWC60	Archaeological Remains	Bowl Barrow	Medium	455860	121070
91	MWC7713	Archaeological Remains	Former Quarry North of Netherhill Farm, Durley	Negligible	455897	112364
92	MWC5053	Archaeological Remains	Guidepost, Stephens Castle Down	Low	455909	121556
93	MWC5075	Archaeological Remains	Stephen's Castle Down	Low	456000	121400
94	MWC5078	Archaeological Remains	Stephen's Castle Down	Low	456100	121770
95	MWC5083	Archaeological Remains	Stephen's Castle Down	Low	456200	121400
96	MWC5084	Archaeological Remains	Stephen's Castle Down	Low	456200	121400
97	MWC6366	Archaeological Remains	Stephen's Castle Down	Low	456200	121400
100	MWC5076	Archaeological Remains	Stephens Castle Down Barrow	Medium	456292	121734

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
103	MWC5082	Archaeological Remains	Field West of Lower Preshaw Farm	Low	456368	122026
106	MWC5060	Historic Building	Old Farmhouse, Formerly Lower Preshaw Cottages	Low	456788	121995
107	MWC4621	Historic Building	Old Farmhouse, Formerly Preshaw Farm Cottages, Preshaw	Low	456788	121996
108	MWC4654	Historic Building	Old Farmhouse, Formerly Preshaw Farm Cottages, Preshaw	Low	456793	122006
111	MWC1939	Archaeological Remains	West of Rabbit Copse	Negligible	458300	123100
112	MWC1937	Archaeological Remains	North of Crookhorn Copse	Negligible	458350	122350
113	MWC1940	Archaeological Remains	West of Rabbit Copse, Barrow	Negligible	458360	123080
114	MWC1941	Archaeological Remains	North of Rabbit Copse	Negligible	458390	123270
115	MWC1938	Archaeological Remains	Rabbit Copse	Low	458480	122900
117	MWC1943	Historic Building	Lomer Farm	Low	458974	123642
118	MWC1960	Archaeological Remains	Field North of Lomer Farm	Low	459100	123800
119	MWC5102	Archaeological Remains	Field West of Rooksgrove Farm	Low	459164	124088
120	MWC5506	Archaeological Remains	Watching Brief at Woodstock Green	Low	459167	124033
121	MWC5104	Archaeological Remains	Field West of Rooksgrove Farm	Medium	459170	124061
123	MWC1963	Archaeological Remains	Lomer Deserted Medieval Village	Medium	459303	123410

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
124	MWC780	Archaeological Remains	Round Barrow	Medium	459810	125070
132	MWC6100	Archaeological Remains	Hinton Ampner/1930	Low	462052	126107
133	MWC960	Archaeological Remains	Hinton Ampner/1930	Low	462052	126107
134	MWC961	Archaeological Remains	Hinton Ampner/1930	Low	462052	126107
135	MWC962	Archaeological Remains	Hinton Ampner/1930	Low	462052	126107
136	MWC963	Archaeological Remains	Hinton Ampner/1930	Low	462052	126107
137	MWC964	Archaeological Remains	Hinton Ampner/1930	Low	462052	126107
138	MWC965	Archaeological Remains	Hinton Ampner/1930	Low	462052	126107
139	MWC966	Archaeological Remains	Barrow South of Joan's Acre Road	Medium	462083	126093
140	MWC5107	Archaeological Remains	Field South of Brockwood Park	Low	462229	125994
146	MWC984	Archaeological Remains	Gravel Pit 1 mile East of Bramdean	Negligible	462500	127500
147	MWC985	Archaeological Remains	A272, Bramdean	Negligible	462500	127600
148	MWC5108	Archaeological Remains	Brockwood Copse	Negligible	462528	125921
157	MWC987	Archaeological Remains	A272, Bramdean	Negligible	462900	127200

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
161	61567	Archaeological Remains	Pits	Negligible	463890	128755
162	61566	Archaeological Remains	Trackway	Low	463960	128815
163	38517	Archaeological Remains	Ring ditch	medium	464070	129030
164	61554	Archaeological Remains	Field System	Low	464082	129484
165	61569	Archaeological Remains	Barrow	Medium	464086	128751
166	61561	Archaeological Remains	Field System	Low	464126	129093
167	61560	Archaeological Remains	Field System	Low	464148	129258
168	61568	Archaeological Remains	Chalk Pit	Negligible	464158	128646
169	61549	Archaeological Remains	Boundary Ditch	Low	464180	129499
170	61552	Archaeological Remains	Barrow	Medium	464209	129524
171	61959	Archaeological Remains	Chalk Pit	Negligible	464222	129644
172	38518	Archaeological Remains	A Complex of Linear and Irregular Features	Low	464260	129690
173	38520	Archaeological Remains	Ring ditch	medium	464260	129690
174	38519	Archaeological Remains	Ring ditch	medium	464260	129690

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
175	38521	Archaeological Remains	Cropmarks East of Bramdean Common	Low	464260	129690
176	61553	Archaeological Remains	Barrow	Medium	464275	129484
177	61551	Archaeological Remains	Barrow	Medium	464277	129553
178	61548	Archaeological Remains	Pit	Negligible	464338	129453
179	61559	Archaeological Remains	Enclosure	Medium	464354	129258
180	61558	Archaeological Remains	Pit	Negligible	464424	129066
181	61544	Archaeological Remains	Enclosure	Medium	464445	129940
182	61546	Archaeological Remains	Field System	Low	464504	129681
183	61961	Archaeological Remains	Barrow	Medium	464575	129183
184	61555	Archaeological Remains	Enclosure	Medium	464575	129221
185	61547	Archaeological Remains	Field System	Low	464624	129445
186	61565	Archaeological Remains	Pit	Negligible	464674	129905
187	62016	Archaeological Remains	Field System	Low	464929	130206
189	18900	Archaeological Remains	Site of Telegraph Station	Low	465100	129900

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
190	63400	Archaeological Remains	Field System	Low	465152	129954
191	38212	Archaeological Remains	Linear Features, Soames Farm	Low	465330	130310
195	41437	Archaeological Remains	Merryfield Farm	Low	466000	130200
196	19044	Archaeological Remains	Roman or Medieval Pottery Findspot	Negligible	466100	130940
197	42280	Historic Building	Trap Shed at Lyeway Farm	Low	466293	132079
198	41237	Archaeological Remains	Lyeway Farm	Low	466315	132079
199	38213	Archaeological Remains	Undated Rectangular Enclosure	Low	466370	131030
200	42279	Historic Building	Farm Buildings at Lyeway Farm	Low	466384	132130
201	38214	Archaeological Remains	Enclosure	Medium	466410	131280
202	39220	Archaeological Remains	Kitwood Farm	Low	467210	133140
203	13305	Historic Building	Jayswood Cottage	Low	467877	133581
204	60810	Archaeological Remains	Bomb Crater	Negligible	467877	133738
207	69365	Archaeological Remains	Aircraft Crash Site	Low	468250	133750
208	60811	Archaeological Remains	Quarry	Negligible	468284	134079
209	19030	Archaeological Remains	Cremation	Low	468600	133960
210	19031	Archaeological	Flint Axeheads	Negligible	468600	133960

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
		Remains				
212	60819	Archaeological Remains	Chalk Pit	Negligible	468732	134202
213	39219	Archaeological Remains	Pies Farm	Negligible	468990	134810
214	30372	Archaeological Remains	Burnt Flint	Negligible	469100	135120
215	30371	Archaeological Remains	Artefact Scatter Worked Flints	Negligible	469100	135120
217	60805	Archaeological Remains	Extractive Pit	Negligible	469156	135446
219	30375	Archaeological Remains	Worked Flint	Negligible	469400	135000
220	30376	Archaeological Remains	Burnt Flint	Negligible	469400	135000
221	30377	Archaeological Remains	Post Medieval Pottery	Negligible	469400	135000
222	30379	Archaeological Remains	Burnt Flint	Negligible	469400	135300
223	30378	Archaeological Remains	Artefact Scatter Worked Flints	Negligible	469400	135300
224	30380	Archaeological Remains	Artefact Scatter Medieval Pottery	Negligible	469400	135300
226	30383	Archaeological Remains	Worked Flint	Negligible	469680	135100
227	30386	Archaeological Remains	Pottery	Negligible	469740	135090
228	30385	Archaeological	Burnt Flint	Negligible	469750	135100

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
		Remains				
229	30384	Archaeological Remains	Worked Flint	Negligible	469755	135110
230	30387	Archaeological Remains	Worked Flint	Negligible	469800	135300
231	30388	Archaeological Remains	Artefact Scatter Burnt Flint	Negligible	469800	135300
232	30390	Archaeological Remains	Burnt Flint	Negligible	469800	135450
233	30389	Archaeological Remains	Flint Debitage	Negligible	469800	135450
234	30391	Archaeological Remains	Several Sherds of Iron Age and Roman Pottery	Negligible	469800	135450
235	30392	Archaeological Remains	Several Sherds of Medieval and Post Medieval Pottery	Negligible	469800	135450
236	39076	Archaeological Remains	Bronze Age Pottery	Negligible	470300	136100
245	62912	Archaeological Remains	Trackway	Low	470591	135726
292	54730	Archaeological Remains	Prehistoric Flint Scatter, East of Broadlands Row	Negligible	471270	136630
294	38533	Archaeological Remains	Undated Earthworks, Broadlands Row	Low	471300	136700
299	62911	Archaeological Remains	Field System	Low	471592	136661
300	36790	Archaeological Remains	Undated Linear Feature North West of Peak Copse	Low	471700	137300
301	62910	Archaeological	Enclosure	Medium	471752	137245

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
		Remains				
302	30673	Archaeological Remains	Medieval Pottery	Negligible	471800	137700
303	30675	Archaeological Remains	Burnt Flint	Negligible	471800	137700
304	30676	Archaeological Remains	Worked Flint	Negligible	471800	137700
305	30672	Archaeological Remains	Roman Pottery	Negligible	471800	137700
306	30674	Archaeological Remains	Post Medieval Pottery	Negligible	471800	137700
307	30671	Archaeological Remains	Iron Age Pottery	Negligible	471800	137700
308	57265	Archaeological Remains	WWII Aircraft Crash Site, Near Westbrook Grange	Low	472200	137800
309	17173	Archaeological Remains	Romano-British Rubbish Pit	Low	472400	137900
310	30723	Archaeological Remains	Roman Pottery and Flint Flakes	Negligible	472500	137800
311	30728	Archaeological Remains	Fieldwalking Survey South of Truncheaunts Farm House	Negligible	472730	137680
312	17104	Archaeological Remains	Possible Site of Manor House, Truncheaunts	Low	472740	137930
321	67097	Archaeological Remains	Wilsom Farm, Alton	Low	473143	138936
322	35786	Archaeological Remains	Chalk pit	Negligible	473170	138570
323	35787	Archaeological	Linear features	Low	473220	138530

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
		Remains				
325	17149	Archaeological Remains	Earthworks	Low	473500	139230
327	30767	Archaeological Remains	Modern Pottery	Negligible	473880	139640
328	30768	Archaeological Remains	Struck Flint	Negligible	473880	139640
331	30773	Archaeological Remains	Artefact Scatter Worked Flints	Negligible	473940	139900
332	30775	Archaeological Remains	Artefact Scatter Post Medieval Pottery	Negligible	473940	139900
333	30774	Archaeological Remains	Burnt Flint	Negligible	473940	139900
339	17108	Archaeological Remains	Possible Medieval Manorial Complex, Monk Wood	Medium	474200	139370
340	30784	Archaeological Remains	Artefact Scatter Worked Flints	Negligible	474200	139730
341	30785	Archaeological Remains	Burnt Flint	Negligible	474200	139730
343	38560	Archaeological Remains	Bonhams Farm	Low	474320	141810
345	35776	Archaeological Remains	Linear and Curvilinear Cropmark Features	Low	474430	141410
347	64945	Archaeological Remains	Roman Agger Terrace	Medium	474702	141171
348	39133	Archaeological Remains	'Roman Remains' Found in an Old Gravel Pit	Negligible	474740	141160
349	35778	Archaeological	Undated Linear Features	Low	474910	141220

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
		Remains				
350	17469	Archaeological Remains	Roman Pottery and Tile Findspot	Negligible	474970	141110
351	17083	Archaeological Remains	Neolithic Flint	Negligible	475100	141500
354	1268	Historic Building	West End Farm - Barn 50m South West of Manor Cottage	Low	475262	142588
358	61124	Archaeological Remains	Site of Pond	Negligible	475300	142540
362	61125	Archaeological Remains	Site of Pond	Negligible	475375	142425
363	61123	Archaeological Remains	Site of Pond	Negligible	475375	142640
364	69214	Archaeological Remains	Land at Froyle House	Low	475389	142704
365	66033	Historic Building	Outbuildings	Low	475414	142682
368	639	Historic Building	Manor House (Now Lord Mayor Treloar College)	Low	475463	142631
370	55726	Historic Building	Froyle Place Cottages	Low	475474	142772
371	41177	Historic Building	Boundary Wall at Lord Mayor Treloar School	Low	475476	142538
372	66032	Historic Building	Newton Davis Complex	Low	475479	142706
373	66031	Historic Building	Porters Lodge	Low	475488	142762
374	66040	Historic Building	Farm Building	Low	475490	142585
376	54810	Archaeological Remains	Findspot of Roman Pottery, Lord Mayor Treloar Hospital	Negligible	475498	142725
377	13415	Historic Building	Stable and Malthouses, 10m East of The Manor House	Low	475503	142620
380	66038	Historic Building	Stores	Low	475529	142610
381	66037	Historic Building	Pavilion	Low	475530	142598
382	66041	Historic Building	Burnham House	Low	475531	142698

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
383	51782	Historic Landscape	Treloars College	Low	475533	142558
384	66036	Historic Building	Treloar School Dining Rooms	Low	475544	142768
393	66034	Historic Building	Pike House	Low	475556	142629
394	13369	Historic Building	Turnpike Cottages	Low	475557	142194
395	17034	Archaeological Remains	Medieval Cross Base	Low	475560	142850
397	1358	Historic Building	Church of St Mary	Low	475564	142871
401	13399	Historic Building	Table Top Tomb 1m South of The Church of St Mary	Low	475575	142866
403	13371	Historic Building	Turnpike Cottages	Low	475576	142208
404	13387	Historic Building	Table Top Tomb 18m North of The Church of St Mary	Low	475576	142896
407	13400	Historic Building	Table Top Tomb 1m South of The Church of St Mary	Low	475581	142870
408	65972	Archaeological Remains	Archaeological Evaluation at Froyle Place	Negligible	475584	142645
412	66035	Historic Building	Heywood Building	Low	475592	142695
414	13388	Historic Building	Table Top Tomb 11m North of The Church of St Mary	Low	475600	142889
434	17035	Archaeological Remains	Medieval Stone Stile	Medium	476010	142760
435	69689	Archaeological Remains	Possible Dam	Low	476028	142519
455	39231	Archaeological Remains	Brocas Farm	Low	476600	143900
460	36041	Archaeological Remains	Linear Feature	Low	477380	144630
462	17022	Archaeological Remains	Cremation Cemetery	Low	477780	144670
466	17507	Archaeological Remains	Site of Roman Villa, Glade Farm	Medium	477910	145820

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
468	42200	Historic Building	Oasthouses at Glade Farm	Low	478124	146097
471	12874	Historic Building	Glade Farm Cottages	Low	478149	146057
472	12873	Historic Building	Glade Farm Cottages	Low	478150	146063
473	12872	Historic Building	Glade Farm Cottages	Low	478151	146069
474	12871	Historic Building	Glade Farm Cottages	Low	478151	146075
477	53933	Archaeological Remains	Linear Features, Glade Farm	Low	478280	146130
495	53934	Archaeological Remains	Trackway, Glade Farm	Low	478550	146130
496	36040	Archaeological Remains	Pipeline visible as cropmark	Negligible	479030	146890
497	35751	Archaeological Remains	Linear feature	Low	479100	146500
523	17493	Archaeological Remains	Roman Villa North of Barley Pound Farm	Medium	479500	147120
539	34559	Archaeological Remains	Artefact Scatter Roman Pottery	Negligible	479600	147600
540	50154	Archaeological Remains	Roman Coin Findspot	Negligible	479600	148300
566	14525	Historic Building	Corner Cottage	Low	479882	148515
567	3696	Historic Building	Byrons Cottage	Low	479891	148489
569	3695	Historic Building	Byrons Cottage	Low	479894	148484
570	3694	Historic Building	Byrons Cottage	Low	479900	148487
571	3693	Historic Building	Byrons Cottage	Low	479907	148491
574	3698	Historic Building	Hilliers	Low	479994	148326
576	17440	Archaeological Remains	Mesolithic Tranchet Axe Findspot	Negligible	480000	148000

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
578	24250	Archaeological Remains	Type 24 Pillbox	Low	480300	149900
580	41756	Archaeological Remains	Ewshot	Low	480400	149100
582	24231	Archaeological Remains	Type 24 Pillbox	Low	480700	150100
583	55372	Archaeological Remains	Site of Crondall Pottery, Heath Lane	Low	480722	148833
584	24274	Archaeological Remains	Type 24 Pillbox	Negligible	480767	149270
585	24257	Archaeological Remains	Type 24 Pillbox	Low	480800	149100
586	24258	Archaeological Remains	Type 24 Pillbox	Low	480800	149200
587	24240	Archaeological Remains	Type 24 Pillbox	Low	480800	150300
588	24273	Archaeological Remains	Type 24 Pillbox	Negligible	480801	149317
589	56625	Archaeological Remains	Part of WWII Barbed Wire Fence Line, North of Riddings Copse	Low	480850	150520
591	24238	Archaeological Remains	WWII Pillbox, South of Dares Lane, Ewshot	Low	480860	150227
593	55439	Archaeological Remains	Site of Ewshot Brick Yard, Ewshot Wood	Low	480904	149673
594	24227	Archaeological Remains	WWII Pillbox, South West Edge of Riddings Copse	Low	480960	150482
595	56612	Archaeological Remains	Army Headquarters, Seymour Farm, Ewshot Lane, Crondall	Low	480991	150332

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
596	56623	Archaeological Remains	Part of WWII Barbed Wire Fence Line, West of Ewshot	Low	481000	150190
597	24239	Archaeological Remains	WWII Pillbox, South of Dares Lane, Ewshot	Low	481000	150300
598	55436	Archaeological Remains	Site of Brick & Timber Yard, East of Ewshot Lodge	Low	481025	150308
600	56610	Archaeological Remains	WWII Pillbox, South East Edge of Riddings Copse	Low	481082	150577
601	56636	Archaeological Remains	WWII Pillbox, South East of Riddings Copse	Low	481086	150454
602	56635	Archaeological Remains	WWII Defensive Earthwork, South East of Riddings Copse	Low	481123	150573
603	56616	Archaeological Remains	WWII Defensive Earthwork, South East of Riddings Copse	Low	481126	150528
604	56614	Archaeological Remains	WWII Gun Emplacement, South East of Riddings Copse	Low	481132	150539
605	24234	Archaeological Remains	WWII Pillbox, Ne Edge of Riddings Copse	Medium	481132	150723
606	56615	Archaeological Remains	WWII Gun Emplacement, South East of Riddings Copse	Low	481137	150524
607	56631	Archaeological Remains	Part of WWII Barbed Wire Fence Line, North of Riddings Copse	Low	481160	150830
608	56634	Archaeological Remains	Part of WWII Barbed Wire Fence Line, North of Riddings Copse	Low	481170	150660
609	56632	Archaeological Remains	Part of WWII Barbed Wire Fence Line, North of Riddings Copse	Low	481180	150820
610	56633	Archaeological Remains	Part of WWII Barbed Wire Fence Line, North of Riddings Copse	Low	481190	150710

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
611	24241	Archaeological Remains	Type 24 Pillbox	Low	481200	150300
612	24228	Archaeological Remains	Type 24 Pillbox	Low	481200	150400
613	24244	Archaeological Remains	Type 24 Pillbox	Low	481200	150600
615	56624	Archaeological Remains	Part of WWII Barbed Wire Fence Line, West of Ewshot	Low	481230	150110
616	63834	Archaeological Remains	Haig Lines, Crookham	Low	481230	150951
617	3708	Historic Building	Hamptons Farmhouse	Low	481238	150237
618	24242	Archaeological Remains	WWII Pillbox, South of Dares Lane, Ewshot	Low	481300	150200
619	64380	Archaeological Remains	Defence Area 34, Ewshot	Low	481300	150500
620	24230	Archaeological Remains	Pillbox	Low	481300	150600
621	24229	Archaeological Remains	Pillbox	Low	481300	150600
622	56618	Archaeological Remains	Part of WWII Barbed Wire Fence Line, West of Ewshot	Low	481310	150390
623	56620	Archaeological Remains	Part of WWII Barbed Wire Fence Line, West of Ewshot	Low	481320	150360
624	56617	Archaeological Remains	Part of WWII Barbed Wire Fence Line, West of Ewshot	Low	481320	150430
625	56619	Archaeological Remains	Part of WWII Barbed Wire Fence Line, West of Ewshot	Low	481360	150480
626	24201	Archaeological	WWII Pillbox, North West of Ewshot	Low	481364	150399

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
		Remains				
627	56622	Archaeological Remains	Part of WWII Barbed Wire Fence Line, West of Ewshot	Low	481370	150210
628	24200	Archaeological Remains	WWII Machine Gun Emplacement, North West of Ewshot	Low	481386	150375
629	24198	Archaeological Remains	WWII Pillbox, Probably a Duplicate Entry	Low	481400	150300
630	24196	Archaeological Remains	WWII Pillbox, Probably a Duplicate Entry	Low	481400	150300
631	24199	Archaeological Remains	WWII Machine Gun Emplacement North West of Ewshot	Low	481405	150367
632	56621	Archaeological Remains	Part of WWII Barbed Wire Fence Line, West of Ewshot	Low	481420	150270
633	56611	Archaeological Remains	WWII Pillbox, North West of Ewshot	Low	481427	150432
634	24243	Archaeological Remains	WWII Pillbox, West of Ewshot	Low	481454	150181
635	56608	Archaeological Remains	Pillbox, Ewshot	Low	481460	150332
636	66332	Archaeological Remains	Evaluation at Queen Elizabeth Barracks, Church Crookham	Low	481475	151100
637	69909	Archaeological Remains	Former Riding School	Negligible	481743	151455
638	63564	Archaeological Remains	Evaluation at Wakeford's Copse	Low	481857	151296
645	50970	Archaeological Remains	Boundary Mound South of Norris Hill West	Low	483200	153300
646	50972	Archaeological	Basingstoke Canal	Medium	483246	153568

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
		Remains				
647	50973	Archaeological Remains	Site of C19 Bridge at Norris Bridge	Low	483273	153553
648	38621	Archaeological Remains	Pyestock/Basingstoke Canal	Low	483300	153600
649	50971	Archaeological Remains	Boundary Mound North of Norris Hill East	Low	483400	153200
650	64030	Archaeological Remains	Archaeological Survey at Former Pyestock Testing Facility, Farnborough	Negligible	484000	154300
651	64385	Archaeological Remains	Rifle Range	Negligible	484302	154362
652	36872	Archaeological Remains	Watching brief	Low	484900	155100
653	38631	Archaeological Remains	Possible Deserted Medieval Settlement, Southwood	Low	485200	155100
654	52304	Historic Landscape	Cove Brook Linear Park	Low	485348	154702
655	63551	Archaeological Remains	Negative Evidence, 2 Southwood Road, Farnborough	Negligible	485360	155780
656	41748	Archaeological Remains	Belmore Farm, Cove	Low	485400	154900
657	50172	Archaeological Remains	West Heath Pottery	Negligible	485400	155800
658	29358	Archaeological Remains	Possible Kiln Site	Negligible	485590	155900
659	35195	Archaeological Remains	Several Sherds of Medieval Pottery	Negligible	485600	154800
660	28655	Archaeological	Potential Saxon Settlement	Low	485650	154800

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
		Remains				
661	38632	Archaeological Remains	Arrow Road, Cove	Low	485700	154700
662	37323	Archaeological Remains	17th Century Pottery	Negligible	485920	155550
663	38627	Archaeological Remains	The Old Court House	Low	485940	155500
664	38626	Archaeological Remains	The Old Court House	Low	485940	155500
667	24181	Archaeological Remains	Pillbox	Low	486300	155800
668	28634	Archaeological Remains	17Th Century of Pottery Dump	Negligible	486300	156200
669	38619	Archaeological Remains	Romayne Close	Negligible	486300	156300
671	55369	Archaeological Remains	Site of Farnborough Workhouse	Low	486493	155905
672	52065	Historic Landscape	Farnborough Grange	Low	486991	157035
675	880	Historic Building	Farnborough Hill	Low	487185	156464
677	56253	Archaeological Remains	Possible Site of a Windmill North of Farnborough	Low	487204	156489
678	65930	Historic Building	The Ship Inn	Low	487219	157087
682	52066	Historic Landscape	Queen Elizabeth Park	Low	487284	156509
683	52068	Historic Landscape	St Michaels Abbey	Low	487306	156017
684	52356	Historic	Farnborough Hill School	Low	487311	156515

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
		Landscape				
687	MSE1424	Archaeological Remains	Mesolithic flaked axe, Frimley	Negligible	487406	157598
688	MSE17189	Archaeological Remains	World War Two Aircraft Crash: Frimley	Low	487500	157800
689	MSE17256	Archaeological Remains	Aircraft Crash: Frimley	Low	487500	157800
690	41920	Archaeological Remains	Site of Three Buildings	Low	487530	156420
691	28632	Archaeological Remains	Farnborough Hill Pottery	Negligible	487542	156623
693	MSE14415	Archaeological Remains	Frimley Park Farm and Manor	Low	487550	158450
694	28626	Archaeological Remains	Medieval Pottery Findspot	Negligible	487580	156530
696	50196	Archaeological Remains	Late Medieval Pottery Kiln	Low	487587	156548
697	59625	Archaeological Remains	Medieval or Post Medieval Kiln Waster Dump	Low	487593	156564
700	28635	Archaeological Remains	19th Century Kiln	Negligible	487600	156300
701	37307	Archaeological Remains	Medieval Pottery, Empress Cottage	Negligible	487600	156400
702	MSE3245	Archaeological Remains	Medieval - Post Medieval Ditch	Low	487600	158100
703	MSE17596	Archaeological Remains	Aircraft Crash: Frimley/Camberley	Low	487600	158200
704	4679	Historic Building	Rose Cottage	Low	487622	156566

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
706	59626	Archaeological Remains	Medieval or Post Medieval Kiln Waster Dump	Low	487634	156489
707	MSE14431	Archaeological Remains	Frimley Village	Low	487650	157970
708	4645	Historic Building	Eugenee Cottage	Low	487657	156434
709	4644	Historic Building	Empress Cottage	Low	487660	156443
710	4599	Historic Building	Empress Cottage	Low	487663	156474
711	4598	Historic Building	Empress Cottage	Low	487666	156470
713	232	Historic Building	Empress Cottage	Low	487667	156465
714	4600	Historic Building	Empress Cottage	Low	487667	156475
716	4643	Historic Building	Ye Olde Farm	Low	487673	156445
718	28628	Archaeological Remains	Pottery Wasters, Ship Lane	Negligible	487680	156440
719	4642	Historic Building	Emperor House	Low	487683	156445
721	66042	Historic Building	Imperial Arms Pub	Low	487694	156548
722	69231	Archaeological Remains	Imperial Arms Pub	Negligible	487699	156566
723	MSE22628	Historic Building	Church of Our Lady Queen of Heaven, Frimley	Low	487760	158210
724	14213	Historic Building	144 Rectory Road	Low	487809	156314
725	MSE18953	Archaeological Remains	Negative Evidence; Old Rectory Cottage, Frimley	Negligible	487825	158280
727	MSE16890	Archaeological Remains	Camberley to Heath End Milestone	Low	487900	158400
729	MSE20036	Archaeological Remains	War Memorial, St Peters Church, Frimley	Low	487962	158070
730	MSE20037	Archaeological Remains	War Memorial, St Peters Church, Frimley	Low	487962	158070

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
731	MSE20038	Archaeological Remains	War Memorial, St Peters Church, Frimley	Low	487962	158070
732	MSE20039	Archaeological Remains	War Memorial, St Peters Church, Frimley	Low	487962	158070
733	MSE20040	Archaeological Remains	War Memorial, St Peters Church, Frimley	Low	487962	158070
734	MSE20041	Archaeological Remains	War Memorial, St Peters Church, Frimley	Low	487962	158070
735	MSE20042	Archaeological Remains	War Memorial, St Peters Church, Frimley	Low	487962	158070
736	MSE20043	Archaeological Remains	War Memorial, St Peters Church, Frimley	Low	487962	158070
737	MSE20044	Archaeological Remains	War Memorial, St Peters Church, Frimley	Low	487962	158070
738	MSE20045	Archaeological Remains	War Memorial, St Peters Church, Frimley	Low	487962	158070
740	MSE14417	Archaeological Remains	Frimley Church	Low	487970	158080
741	MSE14434	Archaeological Remains	Bowling Green Farm, Frimley	Low	488290	157430
742	MSE14433	Archaeological Remains	Moor Farm, Frimley	Low	488420	157150
743	MSE14432	Archaeological Remains	Bedford Farm, Frimley	Low	488440	156770
744	MSE14418	Archaeological Remains	Whitewell Farm, Frimley	Low	488450	157000
745	MSE4371	Archaeological Remains	Probable Romano-British Cremation Cemetery: Whitwell's Farm, Frimley	Low	488480	157010

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
747	MSE14430	Archaeological Remains	Cross Farm, Frimley	Low	488510	156890
749	MSE14421	Archaeological Remains	Berry Hill, Possible Barrow or Burh?	Medium	488580	157020
751	MSE17174	Archaeological Remains	World War Two Aircraft Crash: Frimley Green	Low	488600	156600
752	MSE17253	Archaeological Remains	Aircraft Crash: Frimley Green	Low	488600	156600
753	MSE14422	Archaeological Remains	Frimley Green Village	Low	488600	156700
757	MSE3237	Archaeological Remains	Possible Barrow	Low	488800	158000
758	MSE14419	Archaeological Remains	Frimley Ponds, Fishponds and Dam	Low	488870	158650
759	MSE18954	Archaeological Remains	Negative Evidence: Clewborough High School, Frimley	Negligible	488900	158400
760	MSE21018	Archaeological Remains	Negative Evidence, Clewborough House, Frimley	Negligible	488900	158400
761	MSE14420	Archaeological Remains	Kiln Plat and Field, Frimley	Low	489100	157630
763	MSE3225	Archaeological Remains	Undated Enclosure/Possible Fort	Low	489300	158600
764	MSE14503	Archaeological Remains	U shaped enclosure, Frimley Fuel Allotments	Low	489500	158600
765	MSE22670	Archaeological Remains	Prisoner of War Camp, Frith Hill	Low	489984	158521
766	MSE4721	Archaeological Remains	Foundations, Frith Hill Woodlands, Frimley	Negligible	490000	158800

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
768	MSE6337	Archaeological Remains	Anti Tank Block	Low	490400	158300
769	MSE15105	Historic Landscape	Brompton Hospital Sanatorium Gardens	Low	490469	159147
770	MSE17130	Archaeological Remains	World War Two Aircraft Crash: Deepcut	Low	490500	158100
771	MSE19656	Historic Building	Royal Logistical Corps Museum, Princess Royal Barracks, Deepcut	Low	490605	157919
772	MSE15112	Historic Landscape	Heatherside House Gardens	Low	490665	160634
773	MSE2291	Archaeological Remains	Two Standing Stone Circles	Low	490770	160760
774	MSE4976	Archaeological Remains	Negative evidence, Former Alma and Dettingen Barracks, Deepcut	Negligible	490800	157900
775	MSE6353	Archaeological Remains	Cylinder	Low	490900	158800
776	MSE6395	Archaeological Remains	Pillbox (Type FW3/24)	Low	490900	158800
777	MSE6891	Archaeological Remains	Royal Observer Corps Monitoring Post	Low	491080	159160
778	MSE14494	Archaeological Remains	Military Fieldworks, Hangmoor Hill	Low	491150	161250
779	MSE6396	Archaeological Remains	Pillbox (Type FW3/24)	Low	491300	160700
780	MSE16686	Archaeological Remains	Possible Droving Trails: Chobham	Low	492000	161000
781	MSE14497	Archaeological Remains	Military Fieldworks/ Enclosures, Westend Common Central	Low	492530	161280

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
782	MSE14496	Archaeological Remains	Cultivation Marks, Westend Common Central	Negligible	492600	161100
784	MSE5612	Archaeological Remains	Ditch Feature, Possible Medieval Boundary for Nearby Folly, Pirbright Ranges	Low	492900	161400
785	MSE15115	Historic Landscape	Lightwater Manor Gardens	Low	492971	161648
786	MSE14487	Archaeological Remains	Military Earthworks Turf Hill	Low	493000	161300
787	MSE14472	Archaeological Remains	Lightwater Pond, Pond Bay	Low	493200	161800
791	MSE1851	Archaeological Remains	Three or Four Bronze Age Bowl Barrows: West End Common	Medium	493430	161340
794	MSE14478	Archaeological Remains	The Kiln Field (Blackstrood)	Low	493900	161750
797	MSE14502	Archaeological Remains	Brooklands Farm	Low	494120	161950
799	MSE4095	Archaeological Remains	Hook Mill (Site Of)	Low	494160	162080
800	MSE14477	Archaeological Remains	Hook Mill Watermill	Low	494200	162080
801	MSE14481	Archaeological Remains	Old House Plat	Low	494230	161630
807	MSE14493	Archaeological Remains	Cultivation marks, Hokemede	Negligible	494500	162100
810	MSE14479	Archaeological Remains	Hookstone Farm, West End, Chobham	Low	494620	161870
812	MSE14492	Archaeological Remains	Oval Enclosure Hatch Croft	Medium	494900	162430

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
825	MSE14057	Archaeological Remains	Westcroft Farm	Low	495730	163150
826	MSE17030	Archaeological Remains	World War Two Aircraft Crash: Chobham	Low	495900	162800
828	MSE14101	Archaeological Remains	Steep Acre Farm	Low	496200	163200
834	MSE1859	Archaeological Remains	Barrow (Site of), Chobham	Low	496400	163000
835	MSE17524	Archaeological Remains	Iron Gate: Chobham Place Woods	Low	496400	163630
837	MSE17523	Archaeological Remains	Drystone Ha Ha: Chobham Place Woods	Low	496450	163670
840	MSE15116	Historic Landscape	Manx Farm Parkland	Low	496660	163178
841	MSE14086	Archaeological Remains	Home Farm, Chobham Place	Low	496660	163320
842	MSE10953	Historic Building	Home Farm House	Low	496660	163324
845	MSE14100	Archaeological Remains	Burrow Hill Farm	Low	496870	163110
849	MSE17508	Archaeological Remains	Enclosure: Clearmount	Medium	497050	163980
851	MSE17501	Archaeological Remains	Enclosure: Portobello	Medium	497200	163400
852	MSE17502	Archaeological Remains	Fish pond site: Marlake	Low	497200	163800
853	MSE17503	Archaeological Remains	Former allotment enclosure: Jubilee Mount	Negligible	497200	164000
856	MSE17500	Archaeological	Possible Quarry or Industrial Site: Killy Hill	Negligible	497300	163200

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
		Remains				
866	MSE17498	Archaeological Remains	Possible Holloways: Jubilee Clump	Low	497600	164100
867	MSE17496	Archaeological Remains	Earthworks: Albury Bottom	Medium	497630	164350
868	MSE14053	Archaeological Remains	Brimshot Farm	Low	497670	163100
870	MSE15122	Historic Landscape	Westways Farm, Chobham	Low	497887	163112
874	MSE13729	Archaeological Remains	Chobham Common Landscape Survey	Medium	498000	164000
876	MSE1869	Archaeological Remains	Chobham Park Farm 17th Century on Site of Moated Mansion Extant 1578	Low	498630	162780
878	MSE1858	Archaeological Remains	Late Bronze Age Urns, Chobham Park Farm	Negligible	498700	162700
881	MSE17509	Archaeological Remains	Mound: Piper's Green	Medium	498800	164700
886	MSE4078	Archaeological Remains	Bowl Barrow	Medium	499120	164560
887	MSE1856	Archaeological Remains	Bowl Barrow, South of Longcross	Medium	499120	164660
888	MSE1862	Archaeological Remains	Possible Barrow Site	Low	499180	165130
890	MSE17499	Archaeological Remains	Linear Earthworks: Piper's Green	Low	499200	164600
892	MSE5284	Archaeological Remains	Struck Flint flake, Flutters Hill House, Long Cross	Negligible	499288	165102
893	MSE4079	Archaeological	Possible Bowl Barrow	Low	499309	164840

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		Remains				
894	MSE17486	Archaeological Remains	"Fishpool" Fishpond: Childown Farm Cottage	Low	499380	163420
897	MSE14066	Archaeological Remains	Stanyard Farm	Low	499480	163080
899	MSE3803	Archaeological Remains	Sub-circular Feature: Possible Hearth, Longcross	Medium	499520	164910
901	MSE14356	Archaeological Remains	Cultivation Marks, Stone Hill, Runnymede	Negligible	500300	164150
902	MSE14258	Archaeological Remains	Possible Cultivation Marks, Longcross Road	Negligible	500340	165200
903	MSE14326	Archaeological Remains	Possible Location of Medieval Building, Stonehill, Chertsey	Low	500690	164510
904	MSE21917	Historic Building	Fan Court Farm	Low	500790	165630
905	MSE13636	Historic Landscape	Fan Court, Longcross Road, Chertsey	Low	500980	165752
906	MSE5337	Archaeological Remains	Calcinated Flints, Queenwood Farm, Chobham Road, Chobham	Negligible	500983	163995
907	MSE14267	Archaeological Remains	Possible Cultivation Marks, Mushroom Farm	Negligible	501200	165700
908	MSE14260	Archaeological Remains	Possible Cultivation Marks, Fan Court	Negligible	501210	165740
910	MSE14266	Archaeological Remains	Possible Cultivation Marks, Fox Hill	Negligible	501550	165120
912	MSE14229	Archaeological Remains	France Farm, Chertsey	Low	501650	165410
914	MSE14256	Archaeological Remains	Possible Building, Botleys Park	Low	502050	165090

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917	MSE13661	Historic Landscape	Silverlands, Holloway Hill, Chertsey	Low	502182	165557
923	MSE14257	Archaeological Remains	Oval Feature, Possibly an Enclosure, Silverland	Low	502400	165550
924	MSE2357	Archaeological Remains	Mesolithic Implements	Negligible	502400	166000
925	MSE2404	Archaeological Remains	Neolithic Implements	Negligible	502400	166000
926	MSE21025	Archaeological Remains	Large Middle Bronze Age Urn, St Peters Hospital, Chertsey	Negligible	502460	165290
927	MSE602	Archaeological Remains	Possible Moated site, Hardwick Court Farm	Low	502700	165900
931	MSE15219	Historic Landscape	Hardwick Court farm, Hardwick Lane, Lyne, Chertsey	Low	502845	165912
933	MSE15223	Historic Landscape	Rutherwyke House	Low	502894	165619
934	MSE593	Archaeological Remains	Neolithic Axe and Flints, Chertsey	Negligible	503000	166000
935	MSE821	Archaeological Remains	Ring Ditch and Trackway Cropmarks, Chertsey	medium	503300	165850
937	MSE15225	Historic Landscape	Sandgates, Guildford Road, Chertsey	Low	503350	166045
938	MSE5316	Archaeological Remains	17th Century Pottery, Sandgates, Guildford Road, Chertsey	Negligible	503361	166098
939	MSE5746	Archaeological Remains	Negative Evidence: Sandgates, Guildford Road, Chertsey	Negligible	503400	166100
941	MSE21867	Historic Building	Barrsbrook Farm	Low	503430	166210
942	MSE822	Archaeological	Rectangular Enclosure Cropmarks, Chertsey	Low	503580	165670

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		Remains				
943	MSE21864	Historic Building	Pannells Farm	Low	503680	165840
953	MSE2835	Archaeological Remains	Stone Axe, Chertsey	Negligible	504000	166000
954	MSE3150	Archaeological Remains	Roman Bronze Brooch, Chertsey	Negligible	504000	166000
955	MSE598	Archaeological Remains	Mid Bronze Age Spearhead, Chertsey	Negligible	504000	166000
957	MSE823	Archaeological Remains	Enclosure and Ring Ditch Cropmarks, Chertsey	Medium	504100	165590
958	MSE16694	Archaeological Remains	Cropmarks/Soilmarks: Chertsey	Low	504100	165600
963	MSE14247	Archaeological Remains	Enclosure, Cold Harbour Field	Medium	504450	165750
964	MSE6980	Archaeological Remains	Neolithic Occupation Evidence, Land at Painsfield Allotments, Eastworth Road, Chertsey	Medium	504490	166000
965	MSE6981	Archaeological Remains	Middle Bronze Age Occupation, Land at Painsfield Allotments, Eastworth Road, Chertsey	Low	504490	166000
966	MSE6982	Archaeological Remains	Iron Age Pit, Land at Painsfield Allotments, Eastworth Road, Chertsey	Low	504490	166000
974	MSE18354	Archaeological Remains	Post Medieval Ditches and Gullies: Roakes Avenue, Addlestone	Negligible	504600	165800
977	MSE20136	Archaeological Remains	War Memorial, Victory Park, Addlestone	Low	504895	165738
979	MSE5915	Archaeological Remains	Negative Evidence: River Bourne	Negligible	504947	166092
984	MSE3135	Archaeological Remains	Romano-British Bronze Figure, Thames at Chertsey	Negligible	505000	166000

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
985	MSE3667	Archaeological Remains	Two Mesolithic Tranchet Axes	Negligible	505000	166000
990	MSE14283	Archaeological Remains	Hatch Farm, Addlestone	Low	505050	165500
1001	MSE14286	Archaeological Remains	Kiln Field, Hatch Farm, Chertsey	Low	505170	165580
1007	MSE5754	Archaeological Remains	Peat Deposits Indicating Prehistoric Cereal cultivation	Medium	505200	166300
1008	MSE5916	Archaeological Remains	Early Neolithic activity: Mead Lane, Chertsey	Low	505200	166300
1009	MSE18426	Archaeological Remains	Neolithic and Bronze Age Occupation: Manor Farm, Laleham	Medium	505200	169700
1010	MSE816	Archaeological Remains	Ring Ditch Cropmarks, Laleham	medium	505200	169800
1011	MSE5020	Archaeological Remains	Medieval Enclosure, Matthew Arnold School, Near Staines	Low	505200	170630
1012	MSE5019	Archaeological Remains	Negative Evidence, Matthew Arnold School Sports Hall, Near Staines	Negligible	505200	170710
1015	MSE5755	Archaeological Remains	Late Bronze Age/ Early Iron Age Pottery sherds	Negligible	505300	166400
1016	MSE5756	Archaeological Remains	Pottery Dated c. 1230 to 1400 AD, Bridge Wharf, Chertsey	Negligible	505300	166400
1017	MSE5757	Archaeological Remains	Victorian River Wall, Boat Slipway and Other Post Medieval Features, Including Postholes, Pits and a Ditch	Low	505300	166400
1018	MSE884	Archaeological Remains	Caesar's Camp, Medieval Enclosure, Staines	Medium	505320	170650
1020	MSE18455	Historic Building	Factory and Other Buildings: Chertsey Bridge Wharf, Chertsey	Low	505360	166470

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1021	MSE5130	Archaeological Remains	Possible Iron Age Banjo Enclosure and Kiln Site, Matthew Arnold School, Staines	Low	505361	170697
1022	MSE16073	Archaeological Remains	20th Century Military and Civil Boat Building Structures: Bridge Wharf, Chertsey	Medium	505374	166466
1027	MSE575	Archaeological Remains	Bronze Age Sword, Chertsey Bridge	Medium	505390	166640
1029	MSE886	Archaeological Remains	Sub-rectangular Enclosure or Drainage Ditch Cropmarks, Chertsey	Medium	505400	166150
1030	MSE16150	Archaeological Remains	19th century Industrial Features: RADAMEC Site, Bridge Wharf, Chertsey	Low	505400	166400
1031	MSE4184	Archaeological Remains	Late Bronze Age Spearhead	Negligible	505400	166600
1032	MSE19795	Archaeological Remains	Chertsey Lock	Low	505400	166800
1033	MSE18427	Archaeological Remains	Prehistoric Activity: Matthew Arnold School, Staines	Low	505400	170700
1034	MSE19076	Archaeological Remains	Early Neolithic Pit and Pottery: Matthew Arnold School, Staines	Low	505400	170700
1038	MSE2848	Archaeological Remains	Chertsey Bridge circa 1410 - 1780	Low	505420	166580
1042	MSE560	Archaeological Remains	Roman Bronze Dish (Patera) 1st century AD, Thames Between Walton and Chertsey	Negligible	505450	166600
1043	MSE3665	Archaeological Remains	Corporation of London Tax Post, South Side of Chertsey Bridge	Low	505460	166610
1046	MSE3666	Archaeological Remains	Corporation of London Tax Post, 242 Thameside, Chertsey	Low	505470	166710
1047	MSE16981	Archaeological Remains	Human Skull Fragment: Chertsey Meads	Negligible	505500	165900

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
1048	MSE18407	Archaeological Remains	Roman Tessellated Floor: 44 Edinburgh Drive, Staines	Low	505534	170612
1049	MSE887	Archaeological Remains	Sub-circular Enclosure and Ring Ditch Cropmarks, Chertsey	Medium	505550	166060
1050	MSE14282	Archaeological Remains	Possible Burh, Bog Ayte, Chertsey	Low	505600	166800
1051	MSE19803	Archaeological Remains	Ashford Swimming Pool (Demolished)	Negligible	505800	171200
1055	MSE5031	Archaeological Remains	Roman Features, Home Farm, Laleham	Low	505900	168900
1056	MSE5081	Archaeological Remains	Medieval Residual Artefacts, Home Farm, Laleham	Negligible	505900	168900
1057	MSE15286	Archaeological Remains	Negative Evidence: Land at Queen Mary Reservoir, Laleham	Negligible	505900	169400
1058	MSE15363	Archaeological Remains	Negative Evidence: Land South of Queen Mary Reservoir, Laleham	Negligible	505900	169400
1060	MSE4999	Archaeological Remains	Late Neolithic Settlement: Land at Home Farm, Laleham	Medium	505910	169250
1063	MSE14887	Archaeological Remains	Neolithic Occupation Site, South West of Queen Mary Reservoir	Medium	506000	169400
1064	MSE21235	Archaeological Remains	Intake, Littleton Pumping Station & Queen Mary Reservoir, Laleham	Low	506000	169600
1065	MSE5132	Archaeological Remains	Bronze Age Field Systems and Cremation Burials. Home Farm, Laleham	Low	506013	168856
1067	MSE1959	Archaeological Remains	Bronze Age Blade Fragment, Chertsey	Negligible	506100	166200
1068	MSE3114	Archaeological Remains	Iron Age Knife: Littleton Lane	Negligible	506100	167500

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1069	MSE3162	Archaeological Remains	Neolithic Antler Hammer	Negligible	506100	167500
1070	MSE3163	Archaeological Remains	Human Skull - Undated	Negligible	506100	167500
1071	MSE3164	Archaeological Remains	Prehistoric Quernstone	Negligible	506100	167500
1073	MSE10794	Historic Building	Chapel at Remand Centre	Low	506237	171719
1074	MSE5033	Archaeological Remains	Medieval Pottery, Land South West of Queen Mary Reservoir, Laleham	Negligible	506280	169070
1075	MSE5034	Archaeological Remains	Burnt Flint and Flint Flake, Land South West of Queen Mary Reservoir, Laleham	Negligible	506280	169070
1077	MSE5930	Archaeological Remains	Neolithic Pits: Ashford Hospital, Long Lane, Ashford	Low	506338	173009
1079	MSE13899	Archaeological Remains	Negative Evidence: Land off Victory Close, Stanwell	Negligible	506500	173100
1081	MSE19779	Archaeological Remains	Ashford Station	Low	506583	171947
1083	MSE3116	Archaeological Remains	Iron Age Pot and Skeleton: Littleton Avenue	Low	506600	167900
1084	MSE19191	Archaeological Remains	Prehistoric Finds: Land to the south of Shepperton Studios, Shepperton	Negligible	506600	168300
1085	MSE20974	Archaeological Remains	Clarendon Cinema	Low	506600	171700
1086	MSE5071	Archaeological Remains	Negative Evidence, Land Adjacent to the Former St Anne's School, Stanwell	Negligible	506634	173319
1087	MSE19871	Archaeological Remains	Ashford Fire Station	Low	506700	171800
1088	MSE5021	Archaeological	Negative evidence, Land Adjacent the Stanwell Centre,	Negligible	506700	173300

Asset Number	HER / Listing Number	Topic / Aspect	Name	Value	Easting	Northing
		Remains	Stanwell			
1089	MSE5072	Archaeological Remains	Struck Flint, Former Stanwell Centre, Short Lane, Stanwell	Negligible	506750	173200
1090	MSE617	Archaeological Remains	Ring Ditch Cropmark, Stanwell	medium	506810	173200
1092	MSE19814	Archaeological Remains	Clockhouse Lane Gravel Pits	Negligible	506905	172234
1099	MSE19232	Archaeological Remains	Romano-British Field System: Homers Farm, London Road, Bedfont	Low	507100	173200
1100	MLO76985	Archaeological Remains	Mayfield Farm Constructed Wetland Project	Medium	507205	173555
1101	MLO76987	Archaeological Remains	Mayfield Farm Constructed Wetland Project	Low	507205	173555
1102	MLO76988	Archaeological Remains	Mayfield Farm Constructed Wetland Project	Low	507205	173555
1103	MLO76989	Archaeological Remains	Mayfield Farm Constructed Wetland Project	Low	507205	173555

6.2 Table 2: Designated Cultural Heritage Assets

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
1	1337023	Historic Building	II	Brook House	Medium	450700	113097
4	1336938	Historic Building	II	Old Gate House	Medium	450924	113795
8	1322707	Historic Building	II	Church of All Saints	Medium	451158	113005
11	1179547	Historic Building	II	Stapleford Farmhouse	Medium	451200	115921
12	1322710	Historic Building	II	Uplands Farm: Farm Building 30 Yds North West of Farmhouse	Medium	451212	113701
13	1111961	Historic Building	II	Uplands Farm: Barn 30 Yds South West of Farmhouse	Medium	451237	113672
14	1112072	Historic Building	II	31, High Street	Medium	451237	113008
15	1111960	Historic Building	II	Farmhouse at Uplands Farm	Medium	451238	113703
18	1203558	Historic Building	II	Portland House	Medium	451261	112982
19	1111957	Historic Building	II	34, High Street	Medium	451270	113022
21	1112071	Historic Building	II	Botley House	Medium	451295	113003
22	1322643	Historic Building	II	23, High Street	Medium	451305	113003
23	1203548	Historic Building	II	21, High Street	Medium	451312	113003
24	1112070	Historic Building	II	13 and 15, High Street	Medium	451343	113001
25	1203543	Historic Building	II	Market Hall	Medium	451357	112998
26	1322642	Historic Building	II	The Dolphin Hotel & The Dolphin Public House	Medium	451368	112998
27	1111958	Historic Building	II	Bugle Inn	Medium	451387	113041
28	1203631	Historic Building	II	19, Winchester Street	Medium	451402	113154
29	1203501	Historic Building	II	1 and 3, High Street	Medium	451408	113006
30	1322709	Historic Building	II	Hope House	Medium	451412	113187
31	1111963	Historic Building	II	Winchester House	Medium	451414	113107
32	1203623	Historic Building	II	5, Winchester Street	Medium	451417	113085
33	1336937	Historic Building	II	3, Winchester Street	Medium	451418	113073

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
34	1111959	Historic Building	II	8, Winchester Street	Medium	451434	113068
35	1322708	Historic Building	II	2 and 4, Winchester Street	Medium	451441	113028
37	1179516	Historic Building	II	Mitford	Medium	451459	115810
39	1095654	Historic Building	II	Godders	Medium	451493	115815
43	1111962	Historic Building	II	Newhouse Farm; Granary 30 Yds East of Farmhouse	Medium	451581	113963
44	1203605	Historic Building	II	Newhouse Farm; Small Barn 40 Yds North East of Farmhouse	Medium	451588	113979
49	1203600	Historic Building	II	Newhouse Farm; Barn 30 Yds South East of Farmhouse	Medium	451608	113944
51	1350585	Historic Building	II	High House	Medium	451719	114454
53	1301917	Historic Building	II	Granary 5m South of Netherhill House	Medium	451960	115228
54	1095655	Historic Building	II	Netherhill House	Medium	451967	115249
56	1095653	Historic Building	II	Lower Wangfield Farmhouse	Medium	452097	114247
58	1253860	Historic Building	II	Elm Tree Farmhouse	Medium	452389	117394
59	1253870	Historic Building	II	Barn Immediately East South East of Elm Tree Farmhouse	Medium	452412	117388
60	1179503	Historic Building	II	Durley Mill Farmhouse	Medium	452512	115239
61	1301940	Historic Building	II*	Durley Mill, Mill House	High	452544	115203
62	1095656	Historic Building	II	Tarrytown	Medium	452564	117570
63	1350571	Historic Building	II	Barn 10 Metres East of Durley Millhouse	Medium	452569	115238
69	1095716	Historic Building	II	Stakes Farmhouse	Medium	453800	119521
72	1095693	Historic Building	II	Cross Lane Cottage	Medium	454280	118827
73	1350563	Historic Building	II	Cross Lanes Farmhouse	Medium	454423	118678
75	1095718	Historic Building	II	Dell Cottages	Medium	454561	118865
76	1350564	Historic Building	II	Ashton House	Medium	454652	119022

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
77	1156817	Historic Building	II	Old Farm	Medium	454809	119153
78	1095719	Historic Building	II	Little Manor	Medium	454916	119213
79	1095720	Historic Building	II	Barn 20m South of Chapel Farmhouse	Medium	455147	119345
80	1302490	Historic Building	II	Chapel Farmhouse	Medium	455166	119359
82	1157262	Historic Building	II	Cherry Tree Cottage	Medium	455224	119333
84	1350565	Historic Building	II	Jarmans Cottage	Medium	455379	119163
87	1095717	Historic Building	II	Strete End	Medium	455517	119871
88	1350595	Historic Building	II	Belmore House	Medium	455551	121940
98	1178661	Historic Building	II	Barn 50m North East of Dean Farmhouse	Medium	456256	120405
99	1350551	Historic Building	II	Barn 40m North of Dean Farmhouse	Medium	456275	120421
101	1302331	Historic Building	II	Dean Farmhouse	Medium	456301	120371
102	1095694	Historic Building	II	Granary 10m North of Dean Farmhouse	Medium	456314	120404
104	1423733	Historic Building	II	Timber-framed Barn at Lower Preshaw Farm	Medium	456736	122049
105	1301719	Historic Building	II	Old Farmhouse	Medium	456786	121996
109	1301640	Historic Building	II	Granary 5m North of Old Farmhouse	Medium	456799	122007
110	1095544	Historic Building	II	Preshaw House	Medium	457469	123274
116	1350631	Historic Building	II	Lomer Farmhouse	Medium	458974	123644
122	1156487	Historic Building	II	College Down Farm Cottages	Medium	459173	124938
125	1350307	Historic Building	II*	Riversdown	High	460340	124787
126	1155976	Historic Building	II	Black House Farmhouse	Medium	460979	125494
127	1095127	Historic Building	II	Joan's Acre	Medium	461341	126699
128	1155934	Historic Building	II	Stable Block 5m South West of Malthouse Farmhouse	Medium	461364	127611
129	1095122	Historic Building	II	Malthouse Farmhouse	Medium	461381	127624
130	1155817	Historic Building	II	Old Curates House	Medium	461498	127777
131	1095112	Historic Building	II	Bramdean Farmhouse	Medium	461539	127831

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
141	1095154	Historic Building	II	Garden Wall and Gazebo Immediately West South West of Woodcote Manor	Medium	462259	127880
142	1155643	Historic Building	II	The Gardeners Cottage	Medium	462322	127773
143	1155626	Historic Building	II*	Woodcote Manor	High	462330	127900
144	1095153	Historic Building	II	Coach House at Woodcote Manor	Medium	462331	127868
145	1350828	Historic Building	II	Barn at Woodcote Manor 20m East of Coach House	Medium	462361	127855
149	1350848	Historic Building	II	Brockwood Park House	Medium	462533	126437
150	1096191	Historic Building	II	Wellhouse 2 Metres South of Bere Farmhouse	Medium	462558	125257
151	1350305	Historic Building	II	Bere Farmhouse	Medium	462558	125271
152	1096192	Historic Building	II	Granary 8 Metres South of Bere Farmhouse	Medium	462560	125248
153	1095115	Historic Building	II	Barn and Cartshed in Farmyard 100m East of Brockwood House	Medium	462657	126397
154	1095114	Historic Building	II	Barn in Farmyard 100m East of Brockwood House	Medium	462666	126431
155	1350849	Historic Building	II	Granary in Farmyard 100m East of Brockwood House	Medium	462681	126411
156	1095113	Historic Building	II	Brockwood Lodge	Medium	462845	126755
158	1095126	Historic Building	II	Barn at Hinton Woodlands Farm, 30m South West of Farmhouse	Medium	463615	127531
159	1095125	Historic Building	II	Hinton Woodland Farmhouse	Medium	463651	127504
160	1303097	Historic Building	II	Hinton Woodland Cottages	Medium	463718	127560
188	1351153	Historic Building	II*	Church of St Mary Magdalene	High	465019	129212
192	1179928	Historic Building	II	Lyewood Cottage	Medium	465369	131231
193	1339059	Historic Building	II*	Soames Place	High	465453	130697
194	1093942	Historic Building	II	The Malthouse	Medium	465660	132612
205	1093956	Historic Building	II	Jayswood House	Medium	467878	133579

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
206	1093957	Historic Building	II	Semaphore Farm and Boundary Stones	Medium	468068	134719
211	1179402	Historic Building	II	Headmore Farmhouse	Medium	468602	133946
216	1391168	Historic Building	II	Upper Woodside Farm Cottage	Medium	469115	135761
218	1093955	Historic Building	II	Upper Woodside	Medium	469179	135732
225	1179392	Historic Building	II	Lower Woodside Farmhouse	Medium	469464	135884
237	1031900	Historic Building	II	Barn at Southfield Farm	Medium	470350	136600
238	1302040	Historic Building	II	Farringdon Cottage	Medium	470420	135416
239	1339026	Historic Building	II	Farringdon Hurst	Medium	470468	135336
240	1339002	Historic Building	II	Copelands Cottage	Medium	470501	135044
241	1179247	Historic Building	II	The Forge and Little Forge Cottage	Medium	470516	135072
242	1339027	Historic Building	II	Street House Farmhouse	Medium	470528	134957
243	1302045	Historic Building	II	The Malthouse	Medium	470538	135130
244	1093949	Historic Building	II	The Old Barn	Medium	470539	135097
246	1339037	Historic Building	II	Chawton Glebe and Rectory Office	Medium	470660	137152
247	1093970	Historic Building	II	Malthouse Cottages	Medium	470715	137276
248	1178937	Historic Building	II	Chawton Lodge	Medium	470752	137534
249	1380313	Historic Building	II	Churchyard Wall West of Church of St Nicholas	Medium	470763	137031
250	1380316	Historic Building	II	Lychgate North of Church of St Nicholas	Medium	470780	137056
251	1380315	Historic Building	II	Headstone to Ann Frances Prowting, South of Church of St Nicholas	Medium	470783	137003
252	1391282	Historic Building	II	Headstone to Rowland Prowting, St Nicholas' Churchyard, South of St Nicholas' Church	Medium	470784	136999
253	1380317	Historic Building	II	Lychgate South of Church of St Nicholas	Medium	470785	136986
254	1093974	Historic Building	II*	Church of St. Nicholas	High	470791	137033
255	1380314	Historic Building	II	Monument to Cassandra Austin and Cassandra Elizabeth Austin, South of Church of St Nicholas	Medium	470793	137015

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
256	1339036	Historic Building	II	Orchard Cottage	Medium	470807	137467
257	1093969	Historic Building	II	Pond Cottages	Medium	470811	137507
258	1093971	Historic Building	II*	The Manor House	High	470813	137079
259	1093972	Historic Building	II	Store 10m to North of the Manor House	Medium	470814	137096
260	1093980	Historic Building	II	Bakehouse and Stables 20m North of Jane Austen's House	Medium	470831	137602
261	1178917	Historic Building	I	Jane Austen's House	High	470834	137580
262	1339039	Historic Building	II	Clinkers	Medium	470847	137601
263	1093973	Historic Building	II	Home Farm Barn	Medium	470857	137116
264	1093979	Historic Building	II	Ivy Cottage	Medium	470865	137656
265	1302221	Historic Building	II	Content, Stencott, The Cottage, and The Village	Medium	470869	137599
266	1093975	Historic Building	II*	Chawton House	High	470879	137027
267	1339038	Historic Building	II	Home Farmhouse	Medium	470905	137095
268	1093978	Historic Building	II	Springfield, Nos. 1 and 2	Medium	470916	137766
269	1302209	Historic Building	II	Elm Cottage	Medium	470937	137898
270	1093976	Historic Building	II	Cincents Cottage	Medium	470939	137860
271	1178891	Historic Building	II	The Dower House	Medium	470941	137759
272	1093977	Historic Building	II	Denmead Cottage	Medium	470952	137817
273	1000421	Historic Landscape	II	Chawton House	Medium	470959	136806
274	1302211	Historic Building	II	Alphonsus House	Medium	470959	137845
275	1179280	Historic Building	II	Jordans	Medium	471007	135077
276	1339003	Historic Building	II	Barn 100m South West of Manor House	Medium	471062	135430
277	1093952	Historic Building	II	Holly Cottage	Medium	471106	135102
278	1179007	Historic Building	II	Tylers	Medium	471109	135313
279	1302159	Historic Building	II	Granary 50m South of Manor House	Medium	471156	135444

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
280	1093984	Historic Building	II*	Cruck Cottage	High	471156	135326
281	1302182	Historic Building	II*	Manor House Farmhouse	High	471161	135502
282	1093983	Historic Building	II	Angerton	Medium	471164	135373
283	1093982	Historic Building	II	Cartshed 60m South of Manor House Farmhouse	Medium	471171	135439
284	1179013	Historic Building	II	Church Green Cottage	Medium	471173	135392
285	1339004	Historic Building	II	Farringdon Church of England Primary School and Village Hall	Medium	471184	135370
286	1093943	Historic Building	II	Table Tomb 2m South of the Church Tower	Medium	471228	135431
287	1093945	Historic Building	II	Thatched Cottage	Medium	471230	135379
288	1339022	Historic Building	II	Table Tomb 4m South of the Church Tower	Medium	471236	135429
289	1179147	Historic Building	II*	Church of All Saints	High	471237	135444
290	1339023	Historic Building	II	Berry Cottage	Medium	471257	135382
291	1093944	Historic Building	II	Churchyard Cross 10m South of the Church	Medium	471266	135438
293	1093946	Historic Building	II	The Haunt, and Gilbert's Cottage	Medium	471273	135374
295	1339024	Historic Building	II	Hardings	Medium	471323	135379
296	1093948	Historic Building	II	Old Timbers	Medium	471378	135359
297	1093947	Historic Building	II	Beloms Cottage	Medium	471386	135392
298	1339025	Historic Building	II	Beloms	Medium	471403	135371
313	1094504	Historic Building	II	Truncheaunts	Medium	472747	137936
314	1351155	Historic Building	II	Dovecote 5m East of Truncheaunts	Medium	472772	137931
315	1180053	Historic Building	II	Kiln House	Medium	472777	138145
316	1094135	Historic Building	II	HRH House (Hughes, Richars and Harvey Limited)	Medium	472875	139952
317	1179954	Historic Building	II	Wey Cottage	Medium	472887	139963
318	1338920	Historic Building	II	2, Anstey Mill Lane	Medium	472899	140004
319	1094212	Historic Building	II	1, Anstey Mill Lane	Medium	472900	139998

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
320	1338919	Historic Building	II	Anstey Mill	Medium	472903	139981
324	1094042	Historic Building	II	Upper Neatham Mill House	Medium	473345	140484
326	1179918	Historic Building	II	Mapey's	Medium	473716	141050
329	1001837	Archaeological Remains	SM	Cuckoo's Corner Roman site, Neatham	High	473914	141343
330	1179205	Historic Building	II	Dovecote 20m West of Lower Neatham Mill and Neatham Grange	Medium	473938	140709
334	1094041	Historic Building	II	Barn 10m West of Lower Neatham Mill	Medium	473958	140738
335	1094040	Historic Building	II	Lower Neatham Mill	Medium	473967	140750
336	1179166	Historic Building	II	Neatham Grange	Medium	473988	140730
337	1001787	Archaeological Remains	SM	Cuckoo's Corner Roman settlement, Neatham	High	474070	141045
338	1302071	Historic Building	II	Dovecote 50m South of Neatham House	Medium	474134	140633
342	1094173	Historic Building	II*	Bonham's Farm House	High	474218	141759
344	1179944	Historic Building	II	Bonham's Milestone	Medium	474380	141514
346	1094506	Historic Building	II	Clay's Farmhouse	Medium	474561	138972
352	1179278	Historic Building	II	Thatched Cottage	Medium	475140	142626
353	1094103	Historic Building	II	West End Cottage	Medium	475244	142664
355	1338945	Historic Building	II	Barn 50m South West of Manor Cottage	Medium	475265	142589
356	1179253	Historic Building	II	The Barracks	Medium	475267	142710
357	1094102	Historic Building	II	Home Farm Cottages	Medium	475283	142661
359	1179243	Historic Building	II	Manor Cottage	Medium	475307	142640
360	1338944	Historic Building	II	Gothic Cottage	Medium	475335	142639
361	1179221	Historic Building	II	Froyle House	Medium	475345	142718
366	1179303	Historic Building	II	Stable and Kitchen Garden Wall 30m North West of the Manor House	Medium	475434	142642
367	1094101	Historic Building	II	Froyle Cottage	Medium	475441	142781

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
369	1094104	Historic Building	II*	Manor House	High	475464	142631
375	1338943	Historic Building	II	Barn 20m West of Froyle Place	Medium	475497	142818
378	1179321	Historic Building	II	Stable and Malthouses, 10m East of the Manor House	Medium	475506	142621
379	1094036	Historic Building	II	Fulling Mill	Medium	475512	141713
385	1338941	Historic Building	II	Table Top Tomb 12m North of the Church of St Mary	Medium	475547	142877
386	1094096	Historic Building	II	Table Top Tomb 18m North of the Church of St Mary	Medium	475549	142894
387	1094098	Historic Building	II	Table Top Tomb 12m North of the Church of St Mary	Medium	475550	142879
388	1338980	Historic Building	II	Table Top Tomb 18m North of the Church of St Mary	Medium	475553	142897
389	1179167	Historic Building	II	Table Top Tomb 7m North of the Church of St Mary	Medium	475553	142877
390	1302163	Historic Building	II	Turnpike Cottages	Medium	475554	142194
391	1179185	Historic Building	II*	Froyle Place (Known as Gasston House)	High	475554	142817
392	1338942	Historic Building	II	Table Top Tomb 5m North of the Church of St Mary	Medium	475556	142876
396	1179159	Historic Building	II	Table Top Tomb 11m North of the Church of St Mary	Medium	475561	142890
398	1094095	Historic Building	I	Church of St Mary of the Assumption	High	475568	142871
399	1179172	Historic Building	II	Table Top Tomb 2m North of the Church of St Mary	Medium	475570	142879
400	1094133	Historic Building	II	Turnpike Cottages	Medium	475573	142207
402	1094097	Historic Building	II	Table Top Tomb 18m North of the Church of St Mary	Medium	475576	142897
405	1094099	Historic Building	II	Table Top Tomb 1m South of the Church of St	Medium	475577	142867

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
				Mary			
406	1302058	Historic Building	II	Table Top Tomb 1m South of the Church of St Mary	Medium	475581	142870
409	1094100	Historic Building	II	Table Top Tomb 10m South of the Church of St Mary	Medium	475589	142868
410	1392252	Historic Building	II	Granary 25m South of St Pauls House	Medium	475590	142944
411	1338979	Historic Building	II	St Paul's House	Medium	475590	142978
413	1094039	Historic Building	II	Lodge	Medium	475597	141705
415	1179027	Historic Building	II	Hen & Chicken Public House	Medium	475635	142248
416	1338978	Historic Building	II	Post Office, Post Office Cottage	Medium	475665	143098
417	1094092	Historic Building	II	Barn at Bunden's Farm, 60m North West of Blunden's House	Medium	475670	143199
418	1094094	Historic Building	II	Fern Cottage	Medium	475675	143042
419	1094093	Historic Building	II	Barn at Blunden's Farm, 40m West of Blunden's House	Medium	475686	143172
420	1094091	Historic Building	II	Blunden's Farm	Medium	475708	143204
421	1338977	Historic Building	II	Blunden's House	Medium	475729	143165
422	1179065	Historic Building	II	Mill Court	Medium	475735	141741
423	1094038	Historic Building	II	Service Building 10m East of Mill Court	Medium	475756	141760
424	1179128	Historic Building	II	Stable/Granary 20m East of Mill Court	Medium	475764	141776
425	1179149	Historic Building	II	Garden Wall East at Mill Court	Medium	475770	141757
426	1338992	Historic Building	II	Coach House 20m East of Mill Court	Medium	475781	141762
427	1094037	Historic Building	II	Barn 30m South of Mill Court	Medium	475796	141719
428	1338958	Historic Building	II	Coombefield Cottage	Medium	475796	143389
429	1094134	Historic Building	II	Shrubbery Cottage, The Shrubbery House	Medium	475820	142437

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
430	1302144	Historic Building	II	Milestone 140m East of Shrubbery House	Medium	475889	142576
431	1391443	Historic Building	II	(West Side) Upper Froyle War Memorial	Medium	475907	143524
432	1094129	Historic Building	II	Ewelme	Medium	475983	144277
433	1237467	Historic Building	II	Brecklands	Medium	476006	144109
436	1264089	Historic Building	II	Golden Cottage	Medium	476146	144224
437	1237468	Historic Building	II	Holmwood Cottages	Medium	476163	144228
438	1094131	Historic Building	II	Stables 50m North West of Silvester's Farmhouse	Medium	476166	144205
439	1178995	Historic Building	II	Barn 10m West of Silvester's Farmhouse	Medium	476177	144171
440	1094130	Historic Building	II	Granary 5m South of Silvester's Farmhouse	Medium	476191	144166
441	1178980	Historic Building	II*	Silvester's farmhouse	High	476202	144176
442	1094120	Historic Building	II	Bridge House	Medium	476466	144080
443	1178831	Historic Building	II	Appletree Cottage, Pond Cottage	Medium	476470	144093
444	1302210	Historic Building	II	Granary 15m West of Husseys	Medium	476478	144348
445	1094122	Historic Building	II	Barn 20m South West of Husseys	Medium	476481	144306
446	1338953	Historic Building	II	Old Brewery House	Medium	476483	144117
447	1178840	Historic Building	II	Brewery Cottage	Medium	476496	144159
448	1179006	Historic Building	II	Highway Cottages	Medium	476503	144048
449	1302242	Historic Building	II*	Husseys	High	476505	144332
450	1094121	Historic Building	II	Husseys Farmhouse	Medium	476526	144197
451	1338954	Historic Building	II	Service Building 10m East of Husseys	Medium	476527	144321
452	1094123	Historic Building	II	Wall and Small Gazebo to the east of Husseys and Oast House	Medium	476539	144347
453	1178890	Historic Building	II	The Cottage	Medium	476554	144363
454	1338955	Historic Building	II	Limit Cottages	Medium	476564	144407
456	1094132	Historic Building	II	Brocas Farmhouse. (Formerly Listed as	Medium	476632	143949

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
				Brockhurst Farmhouse)			
457	1094057	Historic Building	II	Stable Block 10m North West of Coldrey Farm	Medium	477055	143701
458	1302259	Historic Building	II*	Coldrey	High	477107	143697
459	1338957	Historic Building	II	Milestone 120m East of Junction with Isington Lane	Medium	477221	143378
461	1001922	Archaeological Remains	SM	Earthwork at Penley	High	477603	145864
463	1094059	Historic Building	II	Crocks Farmhouse	Medium	477832	143772
464	1094058	Historic Building	II	Crocks Cottages	Medium	477877	143774
465	1178858	Historic Building	II	Crocks Farm Cottages	Medium	477881	143719
467	1302233	Historic Building	II	Ash Cottage	Medium	477979	143811
469	1340032	Historic Building	II	Montgomery's Farm Barn	Medium	478133	146588
470	1178781	Historic Building	II	Glade Farm Cottages	Medium	478149	146063
475	1302256	Historic Building	II	Jenkyn Place	Medium	478258	144463
476	1088100	Historic Building	II	Barn at Bury Court Farm	Medium	478273	145225
478	1338961	Historic Building	II	Boundary Wall East of Jenkyn Place	Medium	478285	144473
479	1338996	Historic Building	II	Table Tomb 10m South of St Mary's Church (Nave)	Medium	478403	144674
480	1094049	Historic Building	II	Table Tomb 12m South of St Mary's Church (Nave)	Medium	478404	144672
481	1338997	Historic Building	II	Table Tomb 6m South of St Mary's Church (Nave)	Medium	478406	144679
482	1094050	Historic Building	II	Table Tomb 7m South of St Mary's Church (Nave)	Medium	478407	144677
483	1094090	Historic Building	II*	Church of St Mary	High	478408	144695
484	1338976	Historic Building	II	Table Tomb 15m South of St Mary's Church (Nave)	Medium	478410	144670
485	1094055	Historic Building	II	Table Tomb 5m South of St Mary's Church (Chancel)	Medium	478421	144687

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
486	1094053	Historic Building	II	Table Tomb 15m South of St Mary's Church (Chancel)	Medium	478422	144677
487	1339000	Historic Building	II	Table Tomb 12m South of St Mary's Church (Chancel)	Medium	478423	144682
488	1338999	Historic Building	II	Table Tomb 15m South of St Mary's Church (Chancel)	Medium	478425	144680
489	1178776	Historic Building	II	Table Tomb 9m South of St Mary's Church (Chancel)	Medium	478426	144686
490	1338998	Historic Building	II	Table Tomb 17m South of St Mary's Church (Chancel)	Medium	478426	144677
491	1094054	Historic Building	II	Table Tomb 14m South of St Mary's Church (Chancel)	Medium	478428	144682
492	1094052	Historic Building	II	Table Tomb 19m South of St Mary's Church (Chancel)	Medium	478429	144675
493	1094051	Historic Building	II	Table Tomb 21m South of St Mary's Church (Chancel)	Medium	478430	144674
494	1251528	Historic Building	II	Verneys	Medium	478478	146744
498	1092382	Historic Building	II	Hook Cottage	Medium	479293	148685
499	1339825	Historic Building	II	The Briary	Medium	479298	148751
500	1251731	Historic Building	II	Pilgrims Cottage	Medium	479307	148422
501	1252716	Historic Building	II	Potters Hatch House	Medium	479321	148708
502	1262524	Historic Building	II	Hannams Farm Barn	Medium	479331	148822
503	1092375	Historic Building	II	Kings Head House	Medium	479333	148794
504	1252710	Historic Building	II	Dovas Cottages, Popplewyte, Warey's	Medium	479392	148759
505	1252718	Historic Building	II	Old Meeting House	Medium	479429	148827

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
506	1091956	Historic Building	II	Bathurst House	Medium	479434	148736
507	1092383	Historic Building	II	Chapel Cottage	Medium	479436	148833
508	1251629	Historic Building	II	The Brambles	Medium	479445	148812
509	1091952	Historic Building	II	26, 28 and 30, The Borough	Medium	479451	148834
510	1091958	Historic Building	II	Church Court, Middle Court, North Court, South Court, The Court, West Court	Medium	479456	148393
511	1091955	Historic Building	II	Giffard House	Medium	479457	148766
512	1262649	Historic Building	II	Bathurst Cottage	Medium	479462	148757
513	1262664	Historic Building	II	The Plume of Feathers Public House	Medium	479466	148814
514	1262661	Historic Building	II	The Old Vicarage	Medium	479470	148725
515	1262686	Historic Building	II	Former Congregational Chapel	Medium	479478	148853
516	1091946	Historic Building	I	Church of All Saints	High	479478	148483
517	1091953	Historic Building	II	17, 19 and 21, The Borough	Medium	479482	148826
518	1340033	Historic Building	II	The Old House	Medium	479484	148755
519	1091957	Historic Building	II	Holly Cottage	Medium	479485	148704
520	1251619	Historic Building	II	11 and 15 The Borough	Medium	479489	148832
521	1391132	Historic Building	II	The Dormers	Medium	479489	148737
522	1091951	Historic Building	II	Post Office	Medium	479494	148860
524	1262713	Historic Building	II	10, The Borough	Medium	479505	148867
525	1091950	Historic Building	II	8, The Borough	Medium	479514	148873
526	1251535	Historic Building	II	6, The Borough	Medium	479519	148878
527	1091949	Historic Building	II	2, The Borough	Medium	479528	148882

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
528	1092370	Historic Building	II	The Cedars	Medium	479541	148847
529	1251709	Historic Building	II	The Old Parsonage	Medium	479542	148662
530	1262553	Historic Building	II	Garden Wall to the Cedars	Medium	479544	148855
531	1092380	Historic Building	II	Amberley House	Medium	479550	148885
532	1339821	Historic Building	II	1 and 2 Pankridge Street	Medium	479558	148859
533	1262139	Historic Building	II	Robinsons Cottage, Stendens	Medium	479573	148915
534	1262371	Historic Building	II	Garett's Farmhouse	Medium	479579	148883
535	1339820	Historic Building	II	Dean's Court, The Deans	Medium	479591	148809
536	1092381	Historic Building	II	Hart Cottage	Medium	479593	148949
537	1262562	Historic Building	II	Laun Cottage	Medium	479595	148799
538	1252703	Historic Building	II	The Limes	Medium	479596	148961
541	1092371	Historic Building	II	Dean Cottage	Medium	479601	148794
542	1251918	Historic Building	II	Glebe Cottage	Medium	479609	148794
543	1339815	Historic Building	II	Yew Tree Cottage	Medium	479610	148821
544	1339824	Historic Building	II	Chilloway Cottage, Lea Cottage, Well Cottage	Medium	479621	149004
545	1252411	Historic Building	II	Green's Farmhouse	Medium	479628	149075
546	1001919	Archaeological Remains	SM	Barley Pound earthworks	High	479641	146698
547	1092364	Historic Building	II	The Oast	Medium	479646	148793
548	1092365	Historic Building	II	Old Cottage	Medium	479650	148785
549	1092378	Historic Building	II	Meadow Cottage	Medium	479653	149029
550	1252227	Historic Building	II	The Meade	Medium	479662	149074
551	1092372	Historic Building	II	The Close	Medium	479679	148715
552	1262543	Historic Building	II	Greensleeves	Medium	479694	148690

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
553	1339816	Historic Building	II	Limetrees	Medium	479696	148729
554	1262138	Historic Building	II	Chilloway Cottage	Medium	479701	149530
555	1339823	Historic Building	II	Vine Cottage	Medium	479714	149511
556	1339822	Historic Building	II	Varndells	Medium	479723	149230
557	1252231	Historic Building	II	The Vicarage	Medium	479730	149243
558	1339817	Historic Building	II	Thorns	Medium	479737	148676
559	1092366	Historic Building	II	Chaundlers Farmhouse	Medium	479741	148708
560	1092367	Historic Building	II	Gables	Medium	479759	148653
561	1092368	Historic Building	II	Rambler Cottage	Medium	479777	148634
562	1339818	Historic Building	II	Manor House	Medium	479782	148629
563	1390662	Historic Building	II	Whitebridge	Medium	479822	149391
564	1092379	Historic Building	II	Eastbridge House	Medium	479851	149739
565	1092369	Historic Building	II	The Malt House	Medium	479867	148538
568	1339819	Historic Building	II	Byrons Cottage	Medium	479894	148489
572	1244760	Historic Building	II	Townsend Cottages	Medium	479930	148371
573	1251859	Historic Building	II	Townshend House	Medium	479994	148330
575	1262521	Historic Building	II	Doules Mead	Medium	479996	148616
577	1001912	Archaeological Remains	SM	Powderham Castle	High	480264	146872
579	1092376	Historic Building	II	Dares Farmhouse	Medium	480378	150192
581	1262724	Historic Building	II	Clare Park	Medium	480643	147813
590	1251936	Historic Building	II	Stiller's Farmhouse	Medium	480853	150990
592	1092374	Historic Building	II	Barn to South of Stillers Farmhouse	Medium	480870	150965
599	1252041	Historic Building	II	Combe Wood Cottage	Medium	481068	149667
614	1092373	Historic Building	II	Hampton's Farmhouse	Medium	481224	150256
639	1390802	Historic Building	II	Saddling Stables to West of the Road at	Medium	482351	151749

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
				Tweseldown Racecourse			
640	1390801	Historic Building	II	Saddling Stables to East of the Road at Tweseldown Racecourse	Medium	482380	151767
641	1390800	Historic Building	II	Hay Barn at Tweseldown Racecourse	Medium	482387	151770
642	1390799	Historic Building	II	Offices at Tweseldown Racecourse	Medium	482402	151781
643	1390798	Historic Building	II	Grandstand & Jockey Quaters at Tweseldown Racecourse	Medium	482423	151766
644	1419545	Historic Building	II	Underpass at Tweseldown Racecourse	Medium	482431	151829
665	1092630	Historic Building	II	Church of St Christopher	Medium	486020	155465
666	1259787	Historic Building	II	Ye Old Malthouse	Medium	486131	158129
670	1092605	Historic Building	II	Thatched Cottage Public House	Medium	486349	156246
673	1390603	Historic Building	II	North Lodge, Including Attached Wall, Farnborough Hill School	Medium	487130	156753
674	1092633	Historic Building	II	South Lodge	Medium	487151	157081
676	1303116	Historic Building	I	Main Building to Farnborough Hill Convent	High	487188	156449
679	1092632	Historic Building	II	Monastic Buildings to Abbey Church of St Michael	Medium	487275	156014
680	1155639	Historic Building	I	Abbey Church of St Michael	High	487278	156079
681	1092626	Historic Building	II	Church of St Peter	Medium	487278	155566
685	1092608	Historic Building	II	St Michael's Mews	Medium	487321	155672
686	1156253	Historic Building	II	Farnborough Place	Medium	487351	155586
692	1377519	Historic Building	II	Anglia Building Society	Medium	487544	157889
695	1030070	Historic Building	II	Frimley Park Mansion	Medium	487583	158411
698	1001472	Historic Landscape	II	Frimley Park	Medium	487593	158331
699	1156289	Historic Building	II	Oriel Cottage	Medium	487597	156555
705	1339699	Historic Building	II	Rose Cottage	Medium	487624	156563
712	1092609	Historic Building	II	Empress Cottages	Medium	487666	156470

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
715	1092639	Historic Building	II	Emperor House, Empress Cottage, Euginee Cottage, Ye Olde Farm	Medium	487671	156444
717	1030072	Historic Building	II	The White Hart Public House	Medium	487677	158018
720	1092634	Historic Building	II	Yew Tree Cottage	Medium	487687	156519
726	1030045	Historic Building	II	The Old Rectory	Medium	487831	158226
728	1377507	Historic Building	II	The Grove	Medium	487921	158338
739	1180188	Historic Building	II	Church of St Peter	Medium	487962	158070
746	1030031	Historic Building	II	Whitewells Farmhouse	Medium	488491	157014
748	1030069	Historic Building	II	Cross Farmhouse	Medium	488515	156893
750	1377498	Historic Building	II	Cross Cottage	Medium	488586	156929
754	1295011	Historic Building	II	The Barn	Medium	488643	156648
755	1030071	Historic Building	II	Bedfords Farm House	Medium	488655	156628
756	1188123	Historic Building	II	Church of St Andrew	Medium	488761	156308
762	1377499	Historic Building	II	Frimhurst House	Medium	489215	156440
767	1180168	Historic Building	II	Garrison Church of St Barbara	Medium	490374	157147
783	1294038	Historic Building	II	Pleasant Cottage	Medium	492621	162446
788	1377542	Historic Building	II	Lee lane Farmhouse	Medium	493317	162396
789	1189860	Historic Building	II	Rectory Farm House	Medium	493354	162342
790	1030001	Historic Building	II	Barn 20 Yds of rectory Farm House	Medium	493378	162352
792	1007890	Archaeological Remains	SM	Four Bowl Barrows on West End Common	High	493439	161350
793	1018505	Archaeological Remains	SM	Bowl Barrow at New England, West End Common	High	493618	161290
795	1029995	Historic Building	II	Rose Cottage	Medium	494051	160816
796	1029993	Historic Building	II	Brooklands Farm House	Medium	494118	161976
798	1377540	Historic Building	II	Barn 30 Yards to South of Brooklands Farm House	Medium	494136	161944

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
802	1029994	Historic Building	II	Brentmoor Dene House	Medium	494246	160969
803	1424606	Historic Building	II	The Simmons Memorial Library	Medium	494309	161306
804	1424603	Historic Building	II	Gordon's School Chapel	Medium	494332	161271
805	1424598	Historic Building	II	Assembly Hall and Reception, Gordon's School	Medium	494391	161324
806	1424607	Historic Building	II	Statue of General Gordon, Gordon's School	Medium	494457	161322
808	1406090	Historic Building	II	West End War Memorial	Medium	494542	161201
809	1189823	Historic Building	II	Barn 20 Yards Hookstone Farm House	Medium	494615	161864
811	1029997	Historic Building	II	Hookstone Farm House	Medium	494631	161893
813	1029992	Historic Building	II	Malthouse Farm	Medium	495030	161158
814	1377539	Historic Building	II	Granary 25 Yds East of Malthouse Farm House	Medium	495066	161162
815	1029990	Historic Building	II	Pankhurst	Medium	495204	161713
816	1433986	Historic Building	II	Valley End War Memorial	Medium	495338	163790
817	1377514	Historic Building	II	Church of St Saviour	Medium	495342	163756
818	1377537	Historic Building	II	Bourneside	Medium	495512	161780
819	1377518	Historic Building	II	Penny Cottage	Medium	495583	161766
820	1030030	Historic Building	II	Wall to front of Brook Place	Medium	495598	161735
821	1377516	Historic Building	II	Clock Tower 350 Yds North East of Westcroft Park	Medium	495599	163288
822	1189769	Historic Building	II*	Brook Place	High	495604	161716
823	1030024	Historic Building	II	The Old Vicarage	Medium	495643	163822
824	1294132	Historic Building	II	Maltmans	Medium	495675	161804
827	1030029	Historic Building	II	The Cottage	Medium	495938	163434
829	1294116	Historic Building	II	Steep Acre Farm	Medium	496209	163019
830	1031873	Historic Building	II	The Old Cottage in the Grounds of Frogshole Cottage	Medium	496384	163371
831	1189508	Historic Building	II	Shrubbs Farmhouse	Medium	496386	162530

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
832	1030026	Historic Building	II	Barn 30 Yards North West of Biddles Farm House	Medium	496386	163032
833	1189728	Historic Building	II	Barn 10 Yards North of Biddles Farm House	Medium	496399	163039
836	1030025	Historic Building	II	Biddles Farm House	Medium	496422	163008
838	1189708	Historic Building	II	Buckstone Farm House	Medium	496574	162770
839	1252704	Historic Building	II	Bourne Brook Cottage	Medium	496633	161946
843	1189687	Historic Building	II	Home Farm	Medium	496679	163302
844	1377515	Historic Building	II	Woods Farm House	Medium	496834	162882
846	1030023	Historic Building	II	Burrow Hill Farm House	Medium	496874	163095
847	1030028	Historic Building	II	The Cloche Hat Restaurant	Medium	496970	163031
848	1189761	Historic Building	II	Wayside	Medium	497019	163171
850	1189750	Historic Building	II	Pump at SU 97076293	Medium	497059	162924
854	1030049	Historic Building	II	Fowlers Wells	Medium	497243	162483
855	1189511	Historic Building	II	Fowlers Wells Farmhouse	Medium	497260	162414
857	1030027	Historic Building	II	Dial House	Medium	497421	162119
858	1005950	Archaeological Remains	SM	Bee Garden' Earthwork on Albury Bottom	High	497425	164294
859	1294120	Historic Building	II	Aden Cottage, The Homestead	Medium	497449	162091
860	1377517	Historic Building	II	Northbourne	Medium	497454	162114
861	1377526	Historic Building	II	Coopers Lodge	Medium	497492	162065
862	1294238	Historic Building	II	Pear Tree House	Medium	497493	162098
863	1377525	Historic Building	II	Burr Hill Cottage	Medium	497495	162648
864	1189647	Historic Building	II	Little Heath Farm House	Medium	497517	162788
865	1030047	Historic Building	II	Old Pound Cottage	Medium	497539	162115
869	1189657	Historic Building	II	Paradise Farm House	Medium	497794	163023
871	1030018	Historic Building	II	Westways Farm House	Medium	497889	163112
872	1030017	Historic Building	II	Old Cottage	Medium	497938	162631

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
873	1294157	Historic Building	II	Wayside Cottage	Medium	497970	162580
875	1030016	Historic Building	II	Three Ways Cottage	Medium	498039	162331
877	1030048	Historic Building	II	Chobham Park House	Medium	498633	162782
879	1390819	Historic Building	II	Longcross Church	Medium	498706	165345
880	1390820	Historic Building	II	Lychgate with Attached Churchyard Wall, Longcross Church	Medium	498712	165302
882	1011601	Archaeological Remains	SM	Bowl Barrow 200m West of Barrowhills	High	498868	165671
883	1356747	Historic Building	II	Barrow Hills Garden Terrace	Medium	499084	165696
884	1356738	Historic Building	II	Barrow Hills	Medium	499091	165710
885	1008887	Archaeological Remains	SM	Bowl Barrow 150m North West of Pipers Green Stud	High	499119	164666
889	1030019	Historic Building	II	Fishpool Cottage	Medium	499186	162230
891	1011600	Archaeological Remains	SM	Bowl Barrow 80m North West of Flutters Hill	High	499223	165191
895	1005951	Archaeological Remains	SM	Earthwork Northwest of Childown Farm on Chobham Common	High	499392	163897
896	1377513	Historic Building	II	Stanners Hill Farm House	Medium	499466	163092
898	1189677	Historic Building	II	Barn 25 Yards East of Stanners Hill Farm House	Medium	499512	163071
900	1189674	Historic Building	II	Stanyards Cottage	Medium	500081	162714
909	1039967	Historic Building	II	Lynchgate to Church of Holy Trinity	Medium	501540	165660
911	1242378	Historic Building	II	Church of Holy Trinity	Medium	501561	165689
913	1377929	Historic Building	II	Lodge of Botleys Park	Medium	501839	165022
915	1029181	Historic Building	II*	Botleys Park Hospital	High	502142	164884
916	1029156	Historic Building	II	Anchor House	Medium	502168	165345
918	1295016	Historic Building	II	Ivy Cottage	Medium	502206	165305
919	1380297	Historic Building	II	Silverlands	Medium	502251	165561

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
920	1377913	Historic Building	II	Columbarium Tower at Alm'ner's (Priory)	Medium	502269	166664
921	1377912	Historic Building	II	Alm'ner's (Priory)	Medium	502271	166701
922	1029209	Historic Building	II	Entrance Lodge and Front Railings at Alm'ner's (Priory)	Medium	502308	166645
928	1178262	Historic Building	II	Barn of Hardwick Court Farm to the West of the House	Medium	502767	165892
929	1377904	Historic Building	II	Hardwick Court Farmhouse	Medium	502811	165916
930	1029192	Historic Building	II	Arbon Cottage	Medium	502825	165606
932	1377914	Historic Building	II	Wheelers Green	Medium	502890	164764
936	1377926	Historic Building	II*	Pyrcroft House	High	503346	166818
940	1242370	Historic Building	II	Ice House at Sandgates	Medium	503408	166084
944	1039974	Historic Building	II	Cowley's Almshouses	Medium	503763	166316
945	1039969	Historic Building	II	Chertsey Railway Station Building	Medium	503810	166411
946	1039972	Historic Building	II	16, Fox Lane North	Medium	503827	166491
947	1242287	Historic Building	II	14, Fox Lane North	Medium	503829	166496
948	1242418	Historic Building	II	Clortecnic, No. 20 (Cloretecnic) With Attached Wall and Outbuildings	Medium	503855	166501
949	1242272	Historic Building	II	23 and 25 Guildford Street	Medium	503906	166477
950	1029182	Historic Building	II	George Inn	Medium	503940	166564
951	1178038	Historic Building	II	43, Guildford Street	Medium	503942	166551
952	1029186	Historic Building	II	56, 58, 60, 60a and 60b, Guildford Street	Medium	503980	166570
956	1178048	Historic Building	II	63-67, Guildford Street	Medium	504082	166734
959	1029187	Historic Building	II	90, Guildford Street	Medium	504150	166824
960	1295283	Historic Building	II	56, Eastworth Road	Medium	504231	166279
961	1298907	Historic Building	II	Lock-Keeper's Cottage at Penton Hook House	Medium	504391	169522
962	1008524	Archaeological Remains	SM	Chertsey Abbey: a Benedictine Monastery on the Banks of Abbey River	High	504447	167113

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
967	1377923	Historic Building	II	68-76, London Street	Medium	504491	166799
968	1029155	Historic Building	II	78 and 80, London Street	Medium	504509	166784
969	1377924	Historic Building	II	82 and 84, London Street	Medium	504516	166762
970	1029149	Historic Building	II	91, London Street	Medium	504531	166801
971	1029212	Historic Building	II	The Vine Public House	Medium	504574	166812
972	1307225	Historic Building	II	7, Bridge Road	Medium	504582	166812
973	1029213	Historic Building	II	9, Bridge Road	Medium	504584	166820
975	1029214	Historic Building	II	Laurel Cottage, The Ferns	Medium	504612	166814
976	1242301	Historic Building	II	Home Farm Cottage	Medium	504762	167108
978	1029215	Historic Building	II	34 and 36 Bridge Road	Medium	504915	166752
980	1187065	Historic Building	II	West Boundary Wall of Little Ravenswell and City Post	Medium	504953	168807
981	1177906	Historic Building	II	40, Bridge Road	Medium	504958	166722
982	1029175	Historic Building	II	The George Inn	Medium	504977	165274
983	1280880	Historic Building	II	Little Ravenswell	Medium	504986	168809
986	1187066	Historic Building	II	Old Farm, Riverside	Medium	505003	168803
987	1029176	Historic Building	II	114 and 116 Chertsey Road	Medium	505005	165354
988	1029177	Historic Building	II	Barn at Hatch Farm	Medium	505026	165507
989	1029172	Historic Building	II	Sareth Cottage	Medium	505040	166694
991	1377934	Historic Building	II	Hatch Farmhouse	Medium	505066	165529
992	1187038	Historic Building	II	Muncaster House	Medium	505084	168620
993	1298924	Historic Building	II	High Elms	Medium	505096	168914
994	1298919	Historic Building	II	The Coverts	Medium	505100	168558
995	1204592	Historic Building	II	Yew Corner	Medium	505112	168919
996	1039968	Historic Building	II	Bridge and Other Remains of Abbey Mills at Abbey Chase	Medium	505117	167115

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
997	1187013	Historic Building	II	The Thatched Cottage	Medium	505123	168517
998	1298923	Historic Building	I	Church of All Saints	High	505129	168878
999	1187020	Historic Building	II	Boundary Wall of Yew Corner to Staines Road	Medium	505145	168934
1000	1298906	Historic Building	II	Dial House and No. 1 (Dial Cottage) and No. 2 Dial House Gardens	Medium	505162	168831
1002	1187019	Historic Building	II	Church Farmhouse	Medium	505170	168909
1003	1205073	Historic Building	II	The Corner House	Medium	505171	168958
1004	1187064	Historic Building	II	Three Horse Shoes Public House	Medium	505178	168758
1005	1029173	Historic Building	II	96 and 98 Bridge road	Medium	505187	166641
1006	1187021	Historic Building	II	The Turks Head Public House, Wisteria Cottage	Medium	505192	168959
1013	1187014	Historic Building	II*	Laleham Abbey	High	505216	168194
1014	1177902	Historic Building	II	Belsize Grange	Medium	505248	166667
1019	1005919	Archaeological Remains	SM	Roman Camp, Matthew Arnold School's Playing Field, Staines	High	505353	170641
1023	1298925	Historic Building	II	Manor Farmhouse	Medium	505375	169131
1024	1204602	Historic Building	II	Cambridge and the Red Cottage	Medium	505378	169087
1025	1372053	Historic Building	II	Woburn Hill	Medium	505380	165519
1026	1204639	Historic Building	II	Outbuilding Adjacent to Manor Farmhouse and Barn	Medium	505386	169138
1028	1187022	Historic Building	II	Outbuilding to North East of Barn at Manor Farm	Medium	505394	169143
1035	1029204	Historic Building	II	Chertsey Bridge	Medium	505407	166625
1036	1003752	Archaeological Remains	SM	Chertsey Bridge	High	505412	166625
1037	1187023	Historic Building	II	Granary to South East of Barn at Manor Farm	Medium	505414	169133
1039	1204646	Historic Building	II*	Chertsey Bridge	High	505421	166624
1040	1204664	Historic Building	II	City Post 200 Yards North of Chertsey Lock	Medium	505426	166921

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
1041	1187024	Historic Building	II	City Post at South End of Bridge	Medium	505449	166620
1044	1039970	Historic Building	II	No. 240 (Former Chertsey Lock House)	Medium	505464	166788
1045	1187025	Historic Building	II	City Post in Front of No. 242 Chertsey Bridge Road	Medium	505469	166714
1052	1260107	Historic Building	II	Remains of Archway in Garden to North West of Woburn Park	Medium	505846	165352
1053	1000342	Historic Landscape	II	Woburn Farm	Medium	505861	165517
1054	1390714	Historic Building	II	Milestone	Medium	505883	172549
1059	1039966	Historic Building	II	Railings and Gates in Grounds South West of Woburn Park	Medium	505909	165272
1061	1372054	Historic Building	II	Alcove or Grotto on Lawn to South of Woburn Park	Medium	505926	165249
1062	1260104	Historic Building	II	Woburn Park	Medium	505936	165291
1066	1039965	Historic Building	II	Archway on East Side of Main Entrance Drive of Woburn Park	Medium	506017	165214
1072	1188053	Historic Building	II	Astleham Manor Cottage	Medium	506166	169215
1076	1187067	Historic Building	II	Church of St Hilda	Medium	506286	171706
1078	1187028	Historic Building	II	Railings and Gates Lodge to Welsh School	Medium	506448	172134
1080	1204676	Historic Building	II	Welsh School	Medium	506566	172179
1082	1187027	Historic Building	II	Chapel at Welsh School	Medium	506595	172224
1091	1298922	Historic Building	II	Stanwell Farmhouse	Medium	506878	174236
1093	1005939	Archaeological Remains	SM	Anglo-Saxon and Medieval Cemetery	High	506924	167687
1094	1428691	Historic Building	II	Roman Catholic Church of St Michael, including boundary wall and entrance screen	Medium	506964	171507
1095	1188048	Historic Building	II	Bridge	Medium	506998	168444

Asset Number	HER Number	Topic / Aspect	Grade	Name	Value	Easting	Northing
1096	1029677	Historic Building	II	Entrance Walls and Gate Piers	Medium	507004	168511
1097	1392259	Historic Building	II	Ashford War Memorial	Medium	507008	171536
1098	1377699	Historic Building	I	Church of St Mary Magdalene	High	507068	168639
1104	1187026	Historic Building	II	Parish Church of St Matthew	Medium	507216	171508
1105	1029672	Historic Building	II*	Littleton Manor	High	507259	168652
1106	1002042	Archaeological Remains	SM	Romano-British Site 1000yds (910m) West of East Bedfont Parish Church	High	507561	173804
1107	1002043	Archaeological Remains	SM	Part of a Causewayed Enclosure, 632m North East of Mayfield Farm	High	508014	173683
1108	1001880	Archaeological Remains	SM	Bramdean Roman Villa	High	462738	128138
1109	1001801	Archaeological Remains	SM	Enclosure in Preshaw Wood	High	457827	123012

6.3 Table 3 Historic Landscape Types

Asset Number	Group Type	Historic Landscape Type	Value
HLT01	19th century plantations/other recent woodlands	19th century plantations (general)	Low
HLT02	19th century plantations/other recent woodlands	19th century wood pasture	Low
HLT03	Assarted fields	Large irregular assarts with wavy or mixed boundaries	Low
HLT04	Assarted fields	Medium irregular assarts and copses with wavy boundaries	Low
HLT05	Assarted fields	Regular assarts with straight boundaries	Low
HLT06	Assarted fields	Small irregular assarts intermixed with woodland	Low
HLT07	Commons	Common heathland	Low
HLT08	Commons	Other commons and greens	Low
HLT09	Commons	Wooded over commons	Low
HLT10	Communication facilities	Motorway junctions	Low
HLT11	Extractive industry	Active and disused gravel workings	Low
HLT12	Field Patterns	Large regular fields with straight boundaries (parliamentary enclosure type)	Low
HLT13	Field Patterns	Parkland conversion to arable	Low
HLT14	Field Patterns	'Prairie' fields (large enclosures with extensive boundary loss)	Low
HLT15	Field Patterns	Variable size, semi-regular fields with straight boundaries (parliamentary enclosure type)	Low
HLT16	Fields bounded by roads, tracks and paths	Fields predominantly bounded by tracks, roads, other rights of way	Low
HLT17	Fields with wavy boundaries	Medium to large regular fields with wavy boundaries (late medieval to 17th/18th century enclosure)	Low
HLT18	Fields with wavy boundaries	Regular form with wavy boundaries (late medieval to 17th / 18th century enclosure)	Low
HLT19	Fields with wavy boundaries	Small rectilinear fields with wavy boundaries	Low
HLT20	Heathland	Enclosed heath and scrub	Low
HLT21	Heathland	Unenclosed heath and scrub	Low

Asset Number	Group Type	Historic Landscape Type	Value
HLT22	Heathland plantations	19th century heathland plantations	Low
HLT23	Horticulture	Nurseries with glass houses	Low
HLT24	Horticulture	Nurseries without glass houses	Low
HLT25	Irregular fields - straight boundaries	Irregular straight boundaries	Low
HLT26	Military and defence	20th century	Low
HLT27	Other Industry	Industrial complexes and factories	Low
HLT28	Other Industry	Reservoirs and water treatment	Low
HLT29	Other old woodlands	Other pre-1810 woodland	Low
HLT30	Other old woodlands	Pre 1810 heathland enclosed woodland	Low
HLT31	Parkland	19th century and later parkland	Low
HLT32	Parkland	Deer parks	Low
HLT33	Parkland and designed landscape	19th century and later parkland and large designed gardens	Low
HLT34	Parkland and designed landscape	Pre-1811 parkland	Low
HLT35	Parkland and designed landscape	Smaller designed gardens	Low
HLT36	Parliamentary fields	Medium regular fields with straight boundaries (parliamentary type enclosure)	Low
HLT37	Parliamentary fields	Small regular fields with straight boundaries (parliamentary type enclosure)	Low
HLT38	Recent settlements	Post 1810 settlement (general)	Low
HLT39	Recent settlements	Scattered settlement with paddocks (post 1800 extent)	Low
HLT40	Recreation	Golf Courses	Low
HLT41	Recreation	Major sports fields and complexes	Low
HLT42	Recreation	Marinas	Low
HLT43	Recreation	Motor racing tracks & vehicle testing areas	Low
HLT44	Recreation	Racecourses	Low
HLT45	Recreation	Studs and horse paddocks	Low
HLT46	Settlement related	Caravan sites	Low
HLT47	Settlement related	Common edge and road side waste post-1940	Low
HLT48	Settlement related	Common edge/roadside waste settlement (post-1811 & pre-1940 extent)	Low

Asset Number	Group Type	Historic Landscape Type	Value
HLT49	Settlement related	Hospital complexes (i.e. not within settlements)	Low
HLT50	Settlement related	Large cemeteries (i.e. not adjacent to churches)	Low
HLT51	Settlement related	Post 1811 & pre-1940 settlement - small scale	Low
HLT52	Settlement related	Post-1811 & pre-1940 settlement - large scale estates	Low
HLT53	Settlement related	Post-1811 & pre-1940 settlement - medium estates	Low
HLT54	Settlement related	Post-1940 luxury estates	Low
HLT55	Settlement related	Post-1940 small to medium estates	Low
HLT56	Settlement related	Regular settlement with paddocks post-1940	Low
HLT57	Settlement related	Scattered settlement with paddocks (post-1811 & pre-1940 extent)	Low
HLT58	Settlement related	Village or hamlet (pre-1811 extent)	Low
HLT59	Valley floor	Miscellaneous valley bottom paddocks and pastures	Low
HLT60	Valley floor and water management	Miscellaneous valley floor fields and pastures	Low
HLT61	Valley floor and water management	Post-1811 fishponds, hatchery complexes, 'natural' ponds and lakes	Low
HLT62	Valley floor and water management	Pre-1811 fishponds, hatchery complexes, 'natural' ponds and lakes	Low
HLT63	Valley floor and water management	Valley floor woodlands	Low
HLT64	Valley floor and water management	Water meadows or common meadows	Low
HLT65	Woodland	19th century heathland plantations	Low
HLT66	Woodland	19th century plantations (general)	Low
HLT67	Woodland	Alder Carr (wet woods next to rivers and wetlands)	Low
HLT68	Woodland	Assarted pre-1811 woodland	Low
HLT69	Woodland	Regenerated secondary woodland on farmland - not plantations	Low
HLT70	Woodland	Replanted assarted pre-1811 woodland	Low

Appendix 7
Technical Note Waste and Material

Scoping Report Volume 1

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A7. Waste and Materials

A7.1 Introduction

A7.1.1 This Technical Note considers the effects resulting from the use of material resources and the generation of waste and materials associated with the Project. It covers the construction and operation phases. When the pipeline operator determines that it will permanently cease pipeline operations, it will consider and implement an appropriate strategy to decommission the pipeline, taking account of good industry practice, its obligations to land owners under the relevant pipeline deeds and all relevant statutory requirements.

A7.1.2 Under the Waste Framework Directive, conventional waste is defined as "…any substance, or object, which the holder discards, intends to or is required to discard." Where wastes are being reused on site these are considered to be a 'non waste' and include materials such as rock and minerals.

A7.1.3 This information is intended to feed into Chapter 11 Soils and Geology and Chapter 12 Land Use of this Scoping Report where an assessment of the effects from the use of material resources and the generation of waste and materials from the Project are discussed.

A7.1.4 This Technical Note to the Scoping Report was written by a technical expert in the field of waste and resource management who is currently employed by Jacobs. She has over 14 years' experience in the consultancy sector and 3 years in higher level academia. Her qualifications are Bachelor of Science and she has been a member of Chartered Institute of Waste Management (CIWM) since 2009.

A7.2 Legislation and Policy Framework

A7.2.1 This section presents a summary of the legislation, policy, guidance and standards that are relevant to the waste and materials assessment presented in this Scoping Report.

Legislation

Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017 No. 572)

A7.2.2 Schedule 3 requires information to be included in an Environmental Statement on waste, including:

- part 1(d) requires 'a description of the proposed development, including in particular an estimate, …, of … quantities and types of waste produced during the construction and operation phases';
- part 5 (c) requires a description of the likely significant effects of the development on the environment, including from 'the disposal and recovery of waste'.

A7.2.3 This Technical Note provides an initial outline of the types of waste likely to be produced by the Project, and the potential for likely significant effects arising from its management. It also sets out the scope of the information that would be provided on waste in the ES.

EU Landfill Directive (Directive 1999/31/EC on the landfill of waste) (Ref 13-5) (as amended by 2003/33/EC)

A7.2.4 This Directive establishes a framework for the management of waste across the European Community (now the European Union (EU)). It also defines certain terms, such as 'waste', 'recovery' and 'disposal', to ensure that a uniform approach is taken across the EU.

EU Waste Framework Directive (Directive 2008/98/EC on waste)

A7.2.5 The Waste Framework Directive (WFD; Directive 2008/12/EC on waste) contains the definition of waste. This definition is used to establish whether a material is a waste or not. The Directive introduces the waste hierarchy: waste prevention, recycling and recovery, with disposal as the least desirable option. It sets targets for recycling non-hazardous construction and demolition waste (70% by weight by 2020: Article 10).

The Clean Neighbourhoods and Environment Act 2005, Chapter 16

A7.2.6 It is the responsibility of everyone working in the construction industry to ensure that all waste is disposed of properly. All employees need to be made aware that if they are tasked with waste disposal this must be carried out in accordance with the law, or they risk being fined.

Environmental Permitting (England & Wales) Regulations 2010 (SI 2010 No. 675) as amended by The Environmental Permitting (England and Wales) (Amendment) Regulations 2012, 2014, 2015 and 2016

A7.2.7 The Environmental Permitting (England and Wales) Regulations (EPR) were created to standardise environmental permitting and compliance in England and Wales. Environmental permits are required for industrial and waste activities which could harm human health or the environment unless they are controlled.

The Hazardous Waste (England and Wales) Regulations 2009 and amendment SI 507

A7.2.8 The Regulations require that a Hazardous Waste Consignment Note is produced for each consignment of hazardous waste removed from site.

Waste (England and Wales) Regulations 2011 and 2012 amendment

A7.2.9 The Waste Regulations transpose the Waste Framework Directive into English law. The Regulations require businesses to confirm that they have applied the waste management hierarchy, introduce a new waste hierarchy permit condition and a two-tier system for waste carrier and broker registration.

Policy

National Policy Statements - Energy

A7.2.10 NPS EN-1 sets out overarching national policy guidance on nationally significant energy projects. It is the primary policy for DCO applications. Section 5.14 of EN-1 sets out the generic considerations to be given to the impacts of solid waste.

A7.2.11 NPS EN-4 sets out national policy guidance on gas supply infrastructure. NPS EN-4 includes details of waste gas and investigating mining waste, which is not relevant to reviewing solid waste for this Project.

National Planning Policy Framework (NPPF) March 2012

A7.2.12 The NPPF does not contain specific waste policies as there are detailed policies contained within the Waste Management Plan for England and the Planning Policy for Waste. It is not referenced further in this technical note.

National Planning Policy for Waste (Department for Communities and Local Government, 2014)

A7.2.13 This sets out detailed waste planning policies and should be read in conjunction with the National Planning Policy Framework. It sets out the main principles that are considered when reviewing solid waste from a non-waste development, which have been adhered to in this technical note. It states that:

'when determining planning applications for non-waste development, local planning authorities should ensure that:

- the likely impact of proposed, non-waste related development on existing waste management facilities, and on sites and areas allocated for waste management, is acceptable and does not prejudice the implementation of the waste hierarchy and/or the efficient operation of such facilities;
- the handling of waste arising from the construction and operation of development maximises reuse/recovery opportunities, and minimises off-site disposal.'

Waste Management Plan for England (DEFRA, 2013)

A7.2.14 The plan confirms the UK's commitment to meet its target under the Waste Framework Directive of recovering at least 70% by weight, of construction and demolition waste.

Hampshire's Minerals and Waste Plan (Hampshire County Council, 2013)

A7.2.15 The Plan sets out the objectives and associated waste policies which reflect key points to be considered to enable sustainable waste management in Hampshire. This provides relevant and useful local wastes policies that are considered within this Technical Note.

Draft Surrey Waste Plan 2018 (Surrey County Council, 2018)

A7.2.16 The Draft Surrey Waste Plan sets out the associated waste policies which reflect key points that need to be considered to enable future sustainable waste management in Surrey and identifies how and where waste will be managed in the future. This provides relevant and useful local waste policies and waste resources that are considered within this Technical Note.

A7.3 Baseline Conditions

A7.3.1 A desk based assessment has been undertaken to inform the materials and waste baseline. Baseline data have been collected for both the regional and county level. This includes availability of material resources, construction, demolition and excavation waste arisings. In addition, information on the regional waste management capacity, including remaining landfill void space has been obtained. Data sources that were used include regional level baseline information from records held by the Environment Agency (using the latest available data).

A7.3.2 Table A7.1 provides details on the landfill capacity in Hampshire and Surrey. The table also includes landfill capacity for the entire South East region, which includes the following authorities Berkshire, Buckinghamshire, East Sussex, Hampshire, Kent, Oxfordshire, Surrey and West Sussex. The table shows that there are over 13 million cubic metres of total landfill capacity within Surrey and limited capacity within Hampshire at almost 4 million cubic metres. The table also shows that there are no landfills within Hampshire that can accept hazardous waste with only non-hazardous landfill sites that can accept Stable Non-Reactive Hazardous Wastes (SNRHW) in Surrey.

Table A7.1 Landfill capacity in the South East, 2016

	Hampshire	Surrey	South East
	000s cubic metres		
Hazardous Merchant	0	0	550
Hazardous Restricted	0	0	10
Non Hazardous with SNRHW cell*	0	4,761	29,386
Non Hazardous	1,100	480	17,237
Non Hazardous Restricted	0	0	0
Inert	2,869	8,367	29,795
TOTAL	**3,970**	**13,608**	**76,979**

*Some non-hazardous sites can accept some Stable Non-Reactive Hazardous Wastes (SNRHW) into a dedicated cell, but this is usually a small part of the overall capacity of the site.

A7.3.3 Table A7.2 provides details on the quantities of waste that have been transferred or treated within Hampshire, Surrey and the South East. The table shows that more transfer and treatment was carried out in Hampshire than in Surrey in 2016.

Table A7.2 Quantity of waste transferred or treated in the South East, 2016

	Hampshire	Surrey	South East
	000's tonnes		
Hazardous waste transfer	146	57	849
Material recovery	196	700	1,564
Physical treatment	1,539	744	5,657
Physio-chemical	191	0	987
Composting	206	50	1,839
Biological	286	410	303
Total	**2,564**	**1,961**	**11,199**

A7.4 Likely Significant Effects

A7.4.1 Environmental impacts and effects are likely to arise from those materials which are used in the largest quantities or are high in embodied carbon. They could also arise from wastes of largest quantities, which have hazardous properties or comprise a large proportion of the value of the Project.

Materials Used in Construction

A7.4.2 The potential environmental effects associated with material resource include:

- extraction and transport of primary raw materials;
- manufacture of products; and
- subsequent transport to and use on site.

A7.4.3 Indicative quantities of the main materials that are likely to be required for the Project are detailed in Table A7.3. Steel would be the main material used to form the pipeline. It is likely that some material (such as aggregate and limited concrete) would also need to be imported for placement and compaction above the pipe in some areas. Material would also be required for temporary hardstanding such as compounds. Haulage roads are assumed not to require hardstanding or additional material.

Table A7.3 Estimated quantities of materials used on the Project

Material type	Indicative quantities	Comments
Steel (pipework)	9,400 tonnes	The procurement of the pipework would be likely to include a high percentage of recycled content.
Aggregate materials (secondary aggregate or virgin materials)	9,500 tonnes	This would likely use a high proportion of recycled material to backfill trenches in locations where in situ material is not suitable (for example where the pipeline crosses a road, etc).
Concrete	200 tonnes	This is anticipated for isolated and limited areas only.
Inert material (for temporary hardstanding)	132,000 tonnes	This would likely be recycled materials from demolition sources to provide hardstanding for compound areas (based on the worst case scenario of the largest compounds). (This is also included as a waste from construction process to be recycled / reused after temporary use in the Project).
Fencing	Not currently estimated	Fencing will be required during construction and in specific locations during operation.
Total (rounded to the nearest 1000)	**151, 000 tonnes**	

A7.4.4 Overall the majority of individual materials for this Project are to be used in low quantities (less than 10,000 tonnes) with anticipated high levels of recycled content. However, the inert material for the temporary hardstanding is anticipated to be in excess of 10,000 tonnes. This inert hardstanding material would be from recycled or reused Construction, Demolition and Excavation (CD&E) sources. The South East Aggregates Monitoring Report for 2014 and 2015 (2016) shows that in 2014 there was a CD&E capacity of 8.4 million tonnes. Therefore, the effect of sourcing 132,000 tonnes of inert material from 8.4 million tonnes (from CD&E source) is 1.6%, which is not considered to be significant.

Inert recycled waste materials would be required for the construction of temporary hardstandings, which due to the capacity of materials available is not considered to be significant.
Other materials would not be used in significant quantities.
No operational effects would be significant.

Materials Used in Operation

A7.4.5 It is not anticipated that there would be large quantities of material resource use generated from the operation and maintenance of the Project. Therefore, the effect of material use from the Project is not considered likely to have significant operational environmental impacts (Planning Inspectorate Advice Note 7 question 3).

Waste Produced During Construction

A7.4.6 The potential environmental effects associated with waste would largely be the effect on waste treatment and disposal facilities' available capacity. It is expected that each Contractor would regard site waste management as per the measures set out in the CEMP and REAC. These will be based on established good practice (see Chapter 4). Measures taken to reduce the volume of waste produced would be outlined. The waste hierarchy would be applied to ensure that all waste is managed in accordance with legal requirements. This would reduce the effect of waste generation on the capacity of treatment and disposal facilities. Therefore, potential significant effects on the environment from waste would be reduced.

A7.4.7 Indicative quantities of the main wastes that are likely to be generated by the Project are detailed in Table A7.4. This is a precautionary estimate for the purposes of scoping.

Table A7.4 Estimated main types and quantities of waste likely to be generated from the Project

Waste	Indicative quantities	Comments
Topsoil and inert materials in situ from rural locations	Not currently estimated.	Clean excavated materials from trenches. 100% reuse of this material to refill the trenches in situ.
Wastes from directional drilling	580 tonnes	Excavated material and wastes from tunnelling and drilling processes. Wastes will be sent for treatment or disposal based on the contents

Inert waste (from temporary hardstanding)	132,000 tonnes	The hardstanding from the compound areas will be sent for recycling / reuse. (Note that is also included as a material input from construction process).
Waste from historic / authorised landfills	8,800 tonnes	This waste would potentially all need to be landfilled. There is limited hazardous waste landfill capacity in South East England.
Waste from road excavations	9,500 tonnes	Excavated material and wastes from roads. Wastes will be sent for treatment or disposal based on the contents.
Concrete	20 tonnes	Low concrete wastage from isolated areas only.
Plastic (caps used to protect pipe ends during transit)	15,000 caps (estimated to be 1,500 tonnes)	Investigation to assess if plastic caps can be reused / recycled will form part of future activities.
Municipal waste from construction workers	Minimal tonnage	Over two years, it is expected to be less than 10 tonnes.
Total (rounded to the nearest '000)	**152,000 tonnes**	

A7.4.8 During the construction phase of the Project, it is likely that wastes such as inert wastes, timber, packaging, steel and mixed C&D wastes would be produced. Most of the waste generated at the site would be offcuts from fitting materials, packaging and spent material from the construction activities. It is likely that some municipal type wastes would also be produced from construction workers. All of these wastes would be collected in suitable containers on site / at the compounds prior to removal.

A7.4.9 Resources arising would include topsoil and excavated material from trenching activities in rural areas. The majority of these would be reused by backfilling the trench and levelling the site during restoration. Wastes would also arise from trenchless construction techniques. At this stage, trenchless techniques have not been confirmed, however they would result in a relatively small tonnage of waste being generated. Altogether it is estimated that approximately only 3.5% of the route would be trenchless. Based on worst-case scenario (with a high density of 1.25Te/m^3) this would result in approximately 450 tonnes of wastes being generated. This is a relatively small tonnage and there is sufficient treatment and disposal capacity across Hampshire, Surrey and South East region to manage this waste including options to reuse and recycle. Overall the estimated wastes generated from trenchless crossing activities is not a significant effect on waste facilities capacity within Hampshire, Surrey and South East region.

A7.4.10 There would be wastes generated such as asphalt, made ground and potential contaminated material (such as landfills) that would not be suitable for reuse. These would require further treatment or disposal off-site.

A7.4.11 It is anticipated that for open cut crossings and in line works, all arisings from roads would be excavated, removed and treated as a waste. This waste is likely to be mainly inert waste. In the event that some of the asphalt contains coal tar, this will be managed appropriately, as there are reduced reuse and recycling options available compared to general inert wastes.

A7.4.12 Where there are areas of made ground these would be investigated (by a watching brief) on a case by case basis to maximise reuse of the material in situ and reduce waste arising. Further details on the watching brief are outlined in Chapter 4 sections 'Waste and Contamination' and 'Land Use, Minerals and Soils', and Chapter 11 Soils and Geology.

A7.4.13 Three point seven percent (3.7%) of the route would cross authorised and historic landfills. The design team would examine each occurrence to seek design options (such as whether to go under or around the edge of the landfill or stay within the landfill cap area). This would reduce the need to excavate the authorised or historic landfill waste to lay the pipeline. Any excavated material from the landfill is likely to be classified as a waste and (dependent on the environmental permit status of landfill) would not be reused in situ. In this case, it would be removed to an alternative appropriate landfill site or soil treatment centre. These may include inert, non-hazardous and hazardous waste treatment or disposal facilities. Aggregate / inert material and top soil would need to be used to backfill the trench in the landfill.

A7.4.14 An assumption has been made that two cubic metres would be removed from the landfills to lay a metre of the pipe. This is based on 1.25Te/m3 density (standard waste density for inert waste). From this it has been estimated that approximately 8,800 tonnes could be classified as waste. It is likely that all this waste would require appropriate disposal to landfill. At this stage, based on landfill classifications, it is likely that approximately 3,300 tonnes would be considered inert waste and approximately 5,500 tonnes would be classified as hazardous waste.

A7.4.15 If excavation could not be avoided and hazardous waste was encountered this would require hazardous waste landfill disposal in the limited sites in the South East. Based on the estimate that the hazardous waste generated from landfill waste would be approximately 5,500 tonnes, this would use approximately 1.1% of the available hazardous landfill waste capacity across the South East region. This is not considered significant.

A7.4.16 Table A7.5 summarises the types and quantities of waste generated from the Project and their percentage of capacity in waste facilities (including landfills) within the Hampshire, Surrey and South East. The table demonstrates that there is no significant impact from the waste generated from the Project.

Table A7.5 Waste Capacity for waste likely to be generated from the Project

Waste	Indicative quantities	Percentage of capacity (%)
Topsoil and inert materials in situ from rural locations	Not currently estimated.	n/a – this is reused in situ.

Wastes from directional drilling	580 tonnes	0.004% of physical treatment and inert landfill capacity within Surrey and Hampshire
Inert waste (from temporary hardstanding)	132,000 tonnes	0.8% of physical treatment and inert landfill capacity within Surrey and Hampshire.
Waste from historic and authorised landfills	3,300 (inert waste) tonnes	0.02% of the inert landfill capacity within Surrey and Hampshire.
	5,500 (hazardous waste) tonnes	1.1% of hazardous waste landfill capacity within the South East region
Other construction wastes (including waste from road excavations, concrete, plastics etc.)	11,000 tonnes	0.07% of physical treatment and inert landfill capacity within Surrey and Hampshire.
Total (rounded to the nearest 1000)	**152,000 tonnes**	

A7.4.17 Overall the majority of individual wastes generated from this Project are produced in low quantities (less than 10,000 tonnes). They are therefore unlikely to lead to significant effects (Planning Inspectorate Advice Note 7 question 3). Such wastes would include:

- top soil;
- trenchless crossing wastes;
- waste from road excavations;
- wastes from landfills;
- concrete;
- plastic caps;
- other construction waste; and
- municipal waste.

Imported recycled inert wastes used for temporary hardstandings would be recycled (through physical treatment) or if required disposed to inert landfill. Due to the capacity available there is not considered to be a significant effect.
All other wastes would be in small enough quantities not to cause significant effects.

A7.4.18 The inert waste for the temporary hardstanding is greater than 10,000 tonnes. Within Surrey and Hampshire there were 2.2 million tonnes of annual capacity for physical treatment and 14 million tonnes of landfill capacity in 2014. Altogether it is considered that there is sufficient capacity to treat and / or dispose of this inert waste to not have a significant effect.

Operation

A7.4.19 It is not anticipated that there would be large quantities of waste generated from the operation and maintenance of the Project. The workforce would be a similar size to that which is currently operating and managing the existing pipeline. Therefore

similar waste to the existing pipeline would be expected. Therefore, the effect of waste generation from the Project is not considered likely to have significant operational environmental impacts (Planning Inspectorate Advice Note 7 question 3).

A7.5 Summary

Table A7.6 Matters of significance for materials and waste

Aspect	Matter	Scoped In/Out	Comments
Construction			
Materials	Inert material for temporary hardstanding during construction	Out	Inert recycled materials would be required for the construction of temporary hardstanding, which due to the capacity of materials available from recycled wastes, is not considered to be significant.
Materials	Use of all other materials during construction	Out	Other materials are relatively low tonnages with anticipated high level of recycled content.
Waste	Generation of wastes from directional drilling	Out	Wastes generated through directional drilling are relatively low quantities which can be treated at local waste management facilities. Therefore, there is no potential for significant adverse effect
Waste	Generation of inert waste (from temporary hardstanding)	Out	Inert wastes used for temporary hardstanding would be recycled (through physical treatment) or, if required, disposed of to inert landfill. Due to the available waste management capacity in the region it is not considered to be a significant effect.

Aspect	Matter	Scoped In/Out	Comments
Waste	Generation of waste from historic and authorised landfills	Out	Landfilled waste could potentially be considered as hazardous waste, and there are limited hazardous waste regional facilities available. However, the anticipated hazardous wastes from landfill would utilise 1.1% of the available hazardous waste landfill capacity across the South East region. This is not considered significant.
Waste	Generation of all other construction waste (including waste from road excavations, concrete, plastics etc.)	Out	Other construction wastes are generated in relatively low quantities which can be treated at local waste management facilities. Therefore, there is no potential for significant adverse effects.
Operational			
Material	Use of materials during operation	Out	Due to the low maintenance of the pipeline it is anticipated that there would be limited materials needed during the maintenance of the pipeline. There is no potential for significant adverse effects.
Waste	Generation of operational waste	Out	Due to the low maintenance of the pipeline it is anticipated that there would be very low volumes of waste generated. There is no potential for significant adverse effects.

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Appendix 8.1
Air Quality

Scoping Report Volume 1

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A8.1 Air Quality

A8.1.1 Introduction

A8.1.1.1 The term 'air quality' refers to levels of air pollution that could potentially affect health, such as emissions of air pollutants from car exhausts and other sources such as generators. It also refers to dust, which could affect health or give rise to annoyance due to the soiling of surfaces through deposition. Both air pollution and dust could also affect fauna and flora.

A8.1.1.2 This Scoping Report considers the potential emission sources of air pollutants and dust associated with the Project, as set out below:

- dust emissions generated by construction activities (described in Chapter 3 Description of the Development), including earthworks, trench excavation and material storage;
- emissions of pollutants to air from construction plant and machinery; and
- emissions of pollutants from construction related road vehicles travelling on the local road network.

A8.1.1.3 There are no significant sources of air quality or dust effects associated with the operation of the pipeline.

A8.1.1.4 This appendix was written by a technical expert in the field of Air Quality who is currently employed by Jacobs. He has over 12 years' experience in the consultancy sector. His qualifications are an MSc in Environmental Technology. He has been a member of the Institute of Air Quality Management since 2012.

A8.1.2 Legislation and Policy Requirements

Legislation

Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002

A8.1.2.1 In the UK, the focus on local air quality is reflected in the Air Quality Objectives (AQOs) set out in the Department for Environment, Food and Rural Affairs (DEFRA) Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland.

A8.1.2.2 The AQS defines a number of ambient AQOs for nine main air pollutants which have been established for both the protection of human health and also the protection of vegetation. The AQOs are laid down in the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002.

Air Quality Standards (England) Regulations 2010

A8.1.2.3 The Air Quality Standards (England) Regulations 2010 have the objective to improve air quality by reducing the impact of air pollution on human health and ecosystems and transposes the limit values set out in the EU ambient air quality directive 2008/50/EC to UK law

The Environmental Protection Act 1990

A8.1.2.4 Part III of the Environmental Protection Act defines dust as statutory nuisance, and details the principal controls for managing dust for local authorities.

Policy and Guidance

A8.1.2.5 Whilst National Policy Statements (NPS) EN-1 and EN-4 remain the prime decision making documents (see below), where they do not provide guidance, the following may also be considered important and relevant guidance that may require consideration by the decision making authority. At this stage it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State, and it is included for completeness to allow the Secretary of State to make such a determination.

A8.1.2.6 The Institute of Air Quality Management (IAQM)/Environmental Protection UK (EPUK) guidance Land Use Planning and Development Control: Planning for Air Quality (2017) sets out a screening criteria for identifying the need for an air quality assessment, as follows:

- the change in light duty vehicle (LDV) flows is greater than 100 annual average daily traffic (AADT) within or adjacent to an AQMA or greater than 500 AADT elsewhere; and
- the change in heavy duty vehicles (HDV) flows is greater than 25 AADT within or adjacent to an AQMA or greater than 100 AADT elsewhere.

National Policy Statements - Energy

A8.1.2.7 NPS EN-1 sets out the overarching national policy guidance for nationally significant energy infrastructure projects. Section 5.2 of EN-1 sets out the generic considerations to be given to the impacts of air quality.

A8.1.2.8 NPS EN-4, which presents guidelines for gas and oil pipelines, does not make specific reference to air quality issues.

The National Planning Policy Framework

A8.1.2.9 The National Planning Policy Framework (NPPF) provides a statutory planning framework for England and sets out the Government's view of what sustainable development in England means in practice for the planning system. Paragraph 124 of the NPPF states:

"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

A8.1.2.10 The NPPF therefore requires:

- consideration of a scheme's air quality impacts on the UK's ability to comply with the EU Limit Values; and
- consideration of a scheme's air quality impacts on national objectives for pollutants.

A8.1.2.11 However, the NPPF does not provide guidance on how to come to a judgment on sustaining compliance with the EU Limit Values.

A8.1.3 Baseline conditions

A8.1.3.1 The route passes through eight district / borough local authorities. Of these, Surrey Heath District Council (SHDC), Runnymede Borough Council (RBC) and Spelthorne Borough Council (SBC) have declared Air Quality Management Areas (AQMAs) that are at or near to the route and these are summarised as follows:

- The SHDC AQMA is within 350m of the Order Limits. It was declared due to predicted exceedances of the annual mean nitrogen dioxide (NO2) and 24-hour mean PM10 (particulate matter with an aerodynamic diameter of 10 microns or less) AQOs;
- The route passes through the RBC AQMA along the M25 motorway. This is declared due to predicted exceedances of the annual mean NO2 and 24-hour mean PM10 AQOs; and
- SBC has declared the whole district of Spelthorne as an AQMA. This is due to predicted exceedances of the annual mean NO2 AQOs, within which the route is located.

A8.1.3.2 At locations where the route passes through or close to the AQMAs, the concentrations of the pollutants for which the AQMA has been designated are expected to be close to or exceeding the relevant AQOs. At all other locations along the route, where AQMAs have not been declared, the air would be expected to be of better quality and the AQOs would not be exceeded or be close to being exceeded.

A8.1.3.3 A list of ecological receptors (such as Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs) and Local Nature Reserves) within 1km of the route are presented in Chapter 7 Biodiversity, which includes nine ecological receptors that are located within 50m of the route.

A8.1.4 Likely Significant Effects

A8.1.4.1 This section considers the main emission sources of air pollutants and dust associated with the Project:

- dust emissions generated by construction activities;
- emissions of pollutants to air from construction plant and machinery; and
- emissions of pollutants from construction related road vehicles travelling on the local road network.

A8.1.4.2 There are no significant sources of air quality or dust effects associated with the operation of the pipeline. Therefore, these are not considered further.

A8.1.4.3 Decommissioning activities would be subject to an appropriate decommissioning strategy, as stated in Chapter 3 Description of the Development. It is not appropriate to assess the effects of decommissioning at this stage as the methodology and likely good practice mitigation measures will not be defined until closer to the time, at least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

Emissions of Dust

A8.1.4.4 Construction activities associated with the Project have the potential to generate fugitive dust emissions. These may give rise to annoyance due to the soiling of surfaces, risk of health effects due to the increase in exposure to fine particulates such as PM10 and PM2.5 and damage to vegetation and ecosystems (where very high levels of dust soiling occur).

A8.1.4.5 The main construction activities associated with the Project that could generate dust include earthworks, trench excavation and material storage. Dust may also be generated by vehicle movements.

A8.1.4.6 There are not currently expected to be any demolition activities associated with the Project.

A8.1.4.7 The screening distances to identify where there is a need to consider construction dust are set out within the IAQM Guidance on the Assessment of Dust from Demolition and Construction (2016) as follows:

- the presence of human receptor locations within 350m of the construction site boundaries and/or within 50m of the access route(s) used by construction vehicles on the public highway; and
- the presence of ecological receptors within 50m of the construction site boundaries and access routes.

A8.1.4.8 Along the route there are sensitive human receptors within 350m. In addition, parts of the route pass within 50m of ecological receptors with designations including SSSI, SAC and SPA. Therefore, there would be a risk of dust impacts on human and ecological receptors.

A8.1.4.9 The rate at which the pipeline is estimated to be laid would be approximately 450m of pipeline per week in rural areas and approximately 90m of pipeline per week in urban areas. This means that typically the main construction activities would only be within 350m of any receptor for less than two weeks in rural areas and in urban areas typically for less than eight weeks. The setup of the 61 (approximate) site compounds along the route would cover a maximum area of 6,300 m2 and require less than 4,000 tonnes of material to form the hardstanding. Site areas between 2,500 and 10,000 m2 have a medium dust emission magnitude (based on the IAQM, 2016).

A8.1.4.10 Based on the limited construction activities associated with the construction of the pipeline and the short duration that each receptor would be potentially exposed to the construction works it is considered that there would be a low potential for risk of significant dust impacts.

A8.1.4.11 The risk of dust impacts from these activities can be controlled with the adoption of standard good practice dust mitigation measures and controls. The relevant good practice mitigation measures for the construction phase of the Project have been taken from the IAQM guidance (IAQM, 2016). These mitigation measures and controls are set out in Chapter 4 Design Evolution (Section 4.7), will be included in the CoCP and will be required in the contractor's Construction Environmental Management Plan (CEMP).

A8.1.4.12 The assessment has used IAQM construction dust guidance (IAQM, 2016), and included the application of good practice mitigation measures to prevent or reduce dust emissions (Chapter 4 Design Evolution). IAQM acknowledges that taking these into consideration, the environmental effect from dust emissions would not be significant at any off-site receptor.

With the implementation of the dust mitigation measures and controls, as specified within Chapter 4 Design Evolution, construction dust emissions are not likely to be significant for human and ecological receptors.

A8.1.4.13 Therefore, with the implementation of the dust mitigation measures and controls, the likely effect of dust emissions on human health, amenity and ecological receptors during construction is concluded to be not significant (Planning Inspectorate Advice Note 7 questions 5 and 6).

Emissions from Construction Plant and Machinery

A8.1.4.14 The type and numbers of construction plant and machinery would vary over the construction period and for the eight Sections A-H of the pipeline route. Typical methodologies are outlined in Chapter 3 Description of the Development.

A8.1.4.15 Based a typical urban Section (Sections D-H of the pipeline route), the construction plant and machinery are anticipated to consist of a mixture of the following types:

- tracked machines, such as excavators, typically less than four;
- dumper trucks (5-6 tonne);
- single tool compressor with heavy breaker;
- trench rollers;
- trench rammer;
- single drum rollers; and
- wacker plate.

A8.1.4.16 Based on a typical rural Section (Sections A-C of the pipeline route), the construction plant and machinery are anticipated to consist of a mixture of the following types:

- tracked machines, such as excavators, typically less than four;
- dumper trucks (5-6 tonne); and
- trench rollers.

A8.1.4.17 In addition, the construction is likely to require small diesel generators (4-6 kVa), various petrol saws, welding plant and diesel pumps (if required).

A8.1.4.18 The rate for the pipeline being laid is anticipated to be 450m of pipeline per week in rural areas and 90m per week in urban areas. The construction areas would generally be long and narrow with the works spread out across different parts of a Section at any one time. Where there would be an overlap in construction activities these would typically be undertaking different elements of the works rather than all plant operating at the same location simultaneously. For example, plant associated with the excavation of the pipeline trench would operate in one area initially,

followed further behind by the plant laying the pipe, and then the plant required to refill the excavated material and the levelling of the new surface.

A8.1.4.19 The IAQM construction dust guidance specifies the following in relation to the assessment of emissions to air from construction plant and machinery:

Emissions from construction plant and machinery in rural and urban areas are not considered to be significant for human and ecological receptors.

"Experience of assessing the exhaust emissions from on-site plant (also known as Non-road Mobile Machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed."

A8.1.4.20 Construction plant and machinery would be in operation at any one location for only a short duration. There would also only be a relatively low number and size of plant and machinery items operating during construction simultaneously on each work front (typically less than 15 plant items). Therefore, the potential effect on local air quality at human receptors, outside and inside of AQMAs, and ecological receptors in the vicinity of the construction works would be negligible. On this basis, and in line with IAQM guidance, the effect on air quality from construction plant and machinery emissions in rural and urban areas is considered to be not significant (Planning Inspectorate Advice Note 7 question 3).

Emissions from Road Traffic

A8.1.4.21 Engine exhaust emissions from HDVs and LDVs associated with construction of the Project have the potential to affect local air quality.

A8.1.4.22 The Land Use Planning and Development Control: Planning for Air Quality guidance (IAQM/EPUK, 2017) sets out a screening criteria for identifying the need for an air quality assessment, as follows:

- the change in LDV flows is greater than 100 AADT within or adjacent to an AQMA or greater than 500 AADT elsewhere; and
- the change in HDV flows is greater than 25 AADT within or adjacent to an AQMA or greater than 100 AADT elsewhere.

A8.1.4.23 Based on information provided in Appendix 8.2 Traffic and Transport Technical Note, Table A8.2.4, the expected greatest number of construction traffic movements associated with construction (excluding staff movements) in a rural Section would be a total of 668 HDVs (i.e. 334 in and 334 out) and 194 LDVs (i.e. 97 in and 97 out). As an AADT this is equivalent to three HDVs and one LDVs. This is based on pipeline Section A.

A8.1.4.24 During construction in rural areas there would be expected to be a workforce of up to 10 staff per crew per work front at any one location. Assuming that for commuting, construction workers would lift share with an average of two workers per vehicle and do not leave the site during the day, this gives an additional daily LDV trip generation of 10 vehicle movements per crew. As an AADT this is equivalent to nine LDVs.

A8.1.4.25 Assuming that eight work fronts are working at the same time in a rural area, when combined with the construction traffic, this is equivalent to an additional three HDVs and 10 LDVs movements per day (as an AADT). These movements would be distributed across different road links along the 20 km section length. Therefore, the increase in vehicle movements on individual road links would be likely to be less than those presented.

A8.1.4.26 Based on information provided in Appendix 8.2 Traffic and Transport Technical Note, Table A8.2.5, the greatest number of vehicle movements associated with construction (excluding staff movements) in an urban area is a total of 3,122 HDVs (i.e. 1,561 in and 1,561 out) and 220 LDVs (i.e. 110 in and 110 out). As an AADT this is equivalent to five HDVs and one LDVs. This is based on Section H.

A8.1.4.27 During construction in urban areas there would be expected to be a workforce of up to 10 staff per crew. Assuming that for commuting, construction workers would lift share with on average two workers per vehicle and do not leave the site during the day, this gives an additional daily LDV trip generation of 10 vehicle movements per crew. As an AADT this is equivalent to six LDVs.

A8.1.4.28 Assuming that six work fronts are working at the same time in an urban area, this is equivalent to an additional four HDVs and seven LDVs movements per day (as an AADT). These movements would be distributed across different road links along the 8 km section length, and so the increase in vehicle movements on individual road links are likely to be less than those presented.

A8.1.4.29 The number of daily LDVs associated with construction traffic in rural and urban areas, calculated as an AADT, is 10 and 7, respectively. These changes in daily LDV numbers associated with construction traffic would not exceed the EPUK/IAQM screening criteria. These criteria are:

- 100 daily LDV movements at locations within an AQMA; and
- 500 daily LDV movements at locations outside an AQMA.

A8.1.4.30 The number of daily HDVs associated with construction traffic in rural and urban areas, calculated as an AADT, is three and four, respectively. These changes in daily HDV movements associated with construction traffic would not exceed the EPUK/IAQM screening criteria of:

- 25 daily HDV movements at locations within an AQMA; or
- 100 daily HDV movements outside of an AQMA.

A8.1.4.31 On this basis, the effects from construction road traffic on air quality in rural and urban areas are not considered to represent a significant effect on receptors adjacent to the local road network. The effects would be described as negligible.

A8.1.4.32 Therefore, the air quality effects from construction traffic on human and ecological receptors in rural and urban areas are unlikely to have significant effects on the environment (Planning Inspectorate Advice Note 7 questions 3 and 7).

Emissions from construction related traffic are not considered to be significant at human and ecological receptors.

A8.1.5 Impact Assessment Methodology

A8.1.5.1 As described above, there are unlikely to be significant effects to air quality, which is proposed to be removed from further assessment within the EIA. Should significant changes in the project design occur (embedded or good practice mitigation measures or construction techniques), a review of the potential air quality effects would be undertaken.

A8.1.6 Summary

A8.1.6.1 Table A8.1.1: Summarises the results of the Air Quality significance review.

Table A8.1.1 Matters of significance for air quality

Matter / potential effect	Locations	Comments
Construction dust	Rural and Urban	Scoped out. Mitigation measures set out in Chapter 4 Design Evolution would manage, prevent or reduce dust emissions (Planning Inspectorate Advice Note 7 questions 3 and 5).
Emissions from construction plant and machinery	Rural and Urban	Scoped out due to the low numbers of expected construction plant and short duration of construction activities (Planning Inspectorate Advice Note 7 question 3).
Emissions from construction-related road traffic	Rural and Urban	Scoped out. The predicted change in road traffic numbers on any individual road link is below the criteria for carrying out an air quality assessment (Planning Inspectorate Advice Note 7 questions 3 and 7).

Appendix 8.2
Traffic and Transportation

Scoping Report Volume 1

JACOBS

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A8.2 Traffic and Transportation

A8.2.1 Introduction

A8.2.1.1 This technical note considers the effects on Traffic and Transport of the Project during its construction. This covers factors such as numbers of vehicles, known traffic management, and non-motorised users (NMU). The calculation and impacts of construction traffic on the environment is not a receptor but a source of change.

A8.2.1.2 Operational traffic is likely to be less than one vehicle per day on average at any single location. This would not be on a scale to result in significant effects. The treatment of decommissioning is addressed in Section A8.2.4 and Chapter 3.

Operation and decommissioning of the Project are not likely to be significant for transport effects.

A8.2.1.3 The information in this technical note is intended to feed into Chapter 13 People and Communities. In Chapter 13 an assessment of the effects of the construction traffic and road closures on the local communities along the route is discussed.

A8.2.1.4 This technical note was written by a technical expert in the field of Transport Planning who is currently employed by Jacobs. He has over 12 years' experience in the consultancy sector and 3 years in academia. His qualifications are an MSc in Transport Planning and Management. He has been a member of the Chartered Institute of Highways and Transportation since 2013, and before that was a member of the Chartered Institute of Logistics and Transport.

A8.2.2 Legislation and Policy Requirements

National Policy Statements

A8.2.2.1 National Policy Statement (NPS) EN-1 is the main policy guidance relevant to the current Project with regards to traffic and transport. It states that "The transport of materials, Duty and personnel to and from a development during all project phases can have a variety of impacts on the surrounding transport infrastructure. Impacts may include economic, social and environmental effects."

A8.2.2.2 NPS EN-1 states that consideration and mitigation of transport impacts is an essential part of UK objectives for sustainable development. Should significant transport effects be likely, a development application should include a transport assessment. Consultation should be undertaken with the Highways Authorities as appropriate.

A8.2.2.3 NPS EN-4 refers to traffic and transport effects with relation to noise and vibration. Pipeline effects on other issues associated with traffic are not covered.

A8.2.3 Baseline Conditions

Study Area

A8.2.3.1 A review of available data including traffic flow data and collision data within 2km of the route and associated Order Limits has been undertaken to support this technical note. This was obtained from the Department for Transport (DfT).

Traffic Flows

A8.2.3.2 Section A of the route (from Boorley Green to the A272), has been predicted to have the greatest number of construction traffic movements for a rural area. The traffic flow baseline for this Section is provided in Table A8.2.1 with a plan showing the location of Count Points provided in Figure A8.2.1 (Volume 2).

A8.2.3.3 The traffic flow information for this rural area shows that, away from 'A' class roads, Annual Average Daily Flows (AADF) and peak hour flows are generally low.

Table A8.2.1 Section A DfT traffic flows within 2km of the route

Count point	Road	AADF year	AADF	Peak hour flow				
				Year	Direction 1	Direction 2	Direction 1 flow	Direction 2 flow
16890	A334	2016	18,784	2013	N	S	757	876
56720	A334	2016	19,407	2012	E	W	762	885
78315	A334	2016	18,236	2016	E	W	880	766
931105	Unclassified	2009	249	2009	N	S	14	15
945169	C	2008	677	2008	E	W	65	63
945191	C	2008	254	2008	N	S	16	17
945200	C	2008	135	2008	E	W	10	13
945229	C	2016	3,000	2016	E	W	319	413
945240	C	2016	7,297	2016	N	S	427	368
945449	U	2016	984	2016	E	W	60	68
961349	C56	2009	8,149	2009	N	S	542	338

A8.2.3.4 Section H (Chertsey East to Esso West London Terminal storage facility) has been predicted to have the greatest number of construction traffic movements for an urban area. The traffic flow baseline for this Section is provided in Table A8.2.2 with the location of the Count Points provided in Figure A8.2.2 (Volume 2).

A8.2.3.5 The traffic flow information for this urban area shows that, while there is significant variation in AADF totals, the total daily traffic is generally higher than in rural areas. This is particularly the case when A roads are excluded from the comparison (the construction method indicates that, where appropriate, A roads would be crossed using trenchless techniques to avoid closures and reduce impacts).

Table A8.2.2 Section H DfT traffic flows within 2km of the route

Count point	Road	AADF year	AADF	Peak hour flow				
				Year	Direction 1	Direction 2	Direction 1 flow	Direction 2 flow
966912	C	2009	1,471	2009	N	S	90	97
946143	B376	2016	11,277	2016	E	W	625	480
78399	A320	2016	15,259	2013	N	S	585	861
946266	Unclassified	2008	146	2008	E	W	12	8
946251	Unclassified	2016	267	2016	E	W	23	15
946268	Unclassified	2008	802	2008	N	S	54	49
6904	A320	2016	17,590	2008	N	S	1009	978
946274	Unclassified	2016	1,325	2016	E	W	92	67
990558	Unclassified	2009	3,074	2009	E	W	176	131
946357	Unclassified	2016	305	2016	N	S	18	20
26905	A308	2016	11,534	2010	E	W	472	541
46915	A308	2016	23,917	2012	E	W	1452	1350
946369	Unclassified	2016	1,437	2016	N	S	81	58
7796	A308	2016	13,854	2016	E	W	445	935
17749	A30	2016	29,866	2016	E	W	1582	1456
36310	A30	2016	38,026	2014	E	W	1805	1913
930280	C	2009	14,276	2009	N	S	811	876
942468	Unclassified	2008	255	2008	E	W	16	16
38579	A30	2016	26,394	2015	E	W	1461	1690
990610	Unclassified	2009	2,108	2009	N	S	120	127
73734	A30	2016	45,218	Information not available				
946311	Unclassified	2016	687	2015	E	W	39	40
953083	C	2009	14,352	2008	E	W	800	736

Collisions

A8.2.3.6 Collision data were extracted for 1 January 2012 to 31 December 2016 within two kilometres of the route. The collision cluster data are included in Figure A8.2.3 (Volume 2) for a rural section A and Figure A8.2.4 (Volume 2) for an urban Section H. Simple cluster analysis was undertaken to determine the number and location of collision clusters using the following definition:

- four Personal Injury Collisions (PICs) within 50 metres during a five-year period.

A8.2.3.7 The collision clusters have not, at this time, been reviewed in detail to ensure that they do not include spurious collisions (e.g. within 50 metres but on another road). Data would be reviewed within the Transport Assessment at a later stage of the EIA.

A8.2.3.8 For the rural example, the analysis is illustrated in Figure A8.2.3 (Volume 2). The rural Section A, indicates that there were four collision clusters within two kilometres of the route.

A8.2.3.9 The analysis for the urban Section H is illustrated in Figure A8.2.4 (Volume 2). This shows there are collision clusters at most significant junctions. There are also some at smaller junctions and on sections of carriageway between junctions. The low numbers of construction traffic (both workers and HDVs) means that they are unlikely to contribute to a perceivable increase in collisions. However, the change in behaviour of existing traffic could affect collisions in the area.

A8.2.4 Likely Significant Effects

Construction

A8.2.4.1 The overarching Project assumptions that have informed the assessment of likely significant effects are summarised in Table A8.2.3. Examples were also developed to inform scoping and are included as Table A8.2.4 for rural areas based on Section A, and Table A8.2.5 for urban areas based on Section H, which are the urban and rural route Sections predicted to have the greatest number of construction traffic movements.

Table A8.2.3 Overarching assumptions used in the assessment of transport effects

Assumption	Rural	Urban
Total number of work sections	8 in total	
Maximum concurrent work fronts per section	8	6
Pipe length laid per week	450m	90m
Excavated spoil off-site	Limited	Yes
Standard construction working	Monday – Saturday 0700 to 1900	
Pipe lengths (maximum)	12m	3-6m
	Where trenchless crossings are involved the pipe length would depend on the location and size of the launch area	
Road closures for open cut pipeline crossings of carriageways	2-3 days maximum, Class B roads and lower	
Traffic management	Traffic signals to be provided where pipe is laid along or adjacent to carriageways. Mostly two-way working.	
Staff per work front	10 staff	10 staff
Staff car sharing (people/ car)	2	2
Workforce place of residence	Unknown	

A8.2.4.2 Construction related Heavy Duty Vehicles (HDVs) and Light Duty Vehicles (LDVs) were calculated for each proposed site compound, based on the current construction information. HDVs are those with a gross vehicle weight in excess of 3.5 tonnes. LDVs are classed as those with a gross vehicle weight not exceeding 3.5 tonnes.

A8.2.4.3 Table A8.2.4 (rural) and Table A8.2.5 (urban) present both inbound and outbound vehicle movements associated with the construction of the pipeline and demobilisation of each compound. The construction workforce's predicted daily traffic movements are shown for the average working day based on the information included in Table A8.2.4 and Table A8.2.5. Total vehicle movements were converted into Passenger Car Units based upon a factor of 1.5 for LDVs and 2.0 for HDVs.

Rural Areas

A8.2.4.4 In rural areas daily trip generation associated with the Project would be low. Any traffic diversions that may be required due to road closure would be typically no more than three days. They would generally only require diversions away from minor roads with relatively low traffic flows. A traffic management strategy would include measures to manage traffic diversions in such a way that they satisfy highway authorities that the environmental effects and the impacts on the performance of the transport network would be mitigated. On this basis traffic

effects in rural areas are not considered likely to lead to significant effects on the environment (Planning Inspectorate Advice Note 7 questions 5 and 6, page 8).

Table A8.2.4 Rural construction traffic movements (Section A)

Compound	HDVs	LDVs	Cars	Total	PCUs
Whole construction period for Section A					
Maddoxford Lane	86	0	-	86	172
Gregory lane (S)	58	24	-	82	152
Gregory lane (N)	54	24	-	78	144
Wintershill	56	24	-	80	148
Winchester Road	70	20	-	90	170
Stakes Lane	62	24	-	86	160
Wheely Down Road	76	24	-	100	188
Riverdown Road	90	24	-	114	216
A272	116	30	-	146	277
Total	**668**	**194**	**-**	**862**	**1,627**
Average					
Average day	3	1	10	14	18
Average hour	1	1	2	4	6
Annual average day	3	1	9	12	16
Daily Traffic Demand (based on 8 work fronts)					
Average Day	24	8	80	112	140
Average Hour	3	1	10	14	18

Urban Areas

A8.2.4.5 In urban areas traffic flows are often higher than in rural areas on comparative roads (e.g. when comparing B roads). Any road closures would be typically no more than three days. However, the use of temporary traffic signals may cause increased congestion both on the managed road and on other parts of the road network. The installation, at a rate of 90 metres per week, may require longer sections of road to be managed with temporary traffic signals for more than one week. A traffic management strategy would include measures to manage traffic diversions in such a way that satisfies highway authorities that the environmental effects and the impacts on the performance of the transport network would be mitigated.

Changes in traffic flows in urban areas are not likely to be significant because diversions would typically not last longer than three days.

Journey time effects may be significant because of temporary traffic management.

Effects on collisions and safety may also be significant in urban areas.

A8.2.4.6 The significance of these effects would depend on the volume of traffic flows on roads and at nearby junctions. These may be affected by queuing or re-routing traffic due to construction of the Project This

Changes in journey times for cyclists are not likely to be significant. Traffic management (temporary traffic signals) is anticipated to have minimal effects.

means that, in urban areas, significant effects may be generated for traffic flows, journey times and collisions and safety. There are not expected to be significant effects to journey times for cyclists because this mode is less affected by queuing traffic. (Planning Inspectorate Advice Note 7 questions 2 and 5, pages 7 and 8)

A8.2.4.7 In urban areas it is assumed that the pipeline would be laid at a rate of 90 metres per week. The consequence of this is likely to be diversions of approximately 100 metres for pedestrians around an urban work front. On the basis that urban sections of pipeline are proposed to be laid in 90 metre sections, with each work front lasting for one week, significant effects are not anticipated (Planning Inspectorate Advice Note 7 questions 2 and 5, pages 7 and 8).

Effects on cyclists and pedestrians are not likely to be significant and so are scoped out.

Table A8.2.5 Urban construction traffic movements (Section H)

Compound	HDVs	LDVs	Cars	Total	PCUs
Whole Construction Period for Section H					
West London Terminal-Ashford Sports Ground	64	0	-	64	128
A30 to Ashford Sports Ground	70	0	-	70	140
A30 to Orchard Way- Church Road	144	0	-	144	288
Ashford Station to Ashford Community Centre (Woodthorpe Road Compound)	2,400	0	-	2,400	4,800
M3 to B376 (Southern compound)	268	0	-	268	536
B376 (Northern compound) – Brett Aggregates	176	0	-	176	352
Adhoc movements	0	220	-	220	330
Total	**3,122**	**220**	**-**	**3,342**	**6,574**
Average					
Average day	6	1	10	17	24
Average hour	1	1	2	4	6
Annual average day	4	1	6	10	14
Daily traffic demand (based on 6 work fronts)					
Average day	36	6	60	102	141
Average hour	5	1	8	14	20

Operation

A8.2.4.8 Operational traffic is likely to be less than one vehicle per day on average at any single location. This would not be on a scale to result in significant effects.

The operation of the Project is not likely to be significant for transport effects.

Decommissioning

A8.2.4.9 Decommissioning activities would be subject to an appropriate decommissioning strategy, as per Chapter 3 Description of the Development. It is not practical to assess the effects of decommissioning at this stage as the methodology and likely good practice mitigation measures will not be defined until closer to the time, at

least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

A8.2.5 Impact Assessment Methodology

A8.2.5.1 This section outlines the method which would be used for the assessment of traffic and transport effects. The results would be presented within the Transport Assessment. The Transport Assessment would form part of the application for development consent. The findings of the Transport Assessment would also be drawn upon by the Chapter 13 People and Communities. Within Chapter 13 the significance of impacts from changes in traffic would be assessed and mitigation measures proposed.

Assessment Method

A8.2.5.2 For transport, changes in the following matters would be assessed, based on the method described in this section:

- Journey times for private vehicles and public transport (buses); and
- Collisions and safety.

Journey Times

A8.2.5.3 For journey times there is limited guidance. It is not proposed that junction analysis would be undertaken as part of this assessment. Changes to journey times are most likely to result from traffic diversions required for the Project. The assessment of journey times would therefore focus on this matter. Analysis of diversion routes using speed flow curves would be undertaken. These would be based upon Future Baseline and 'with Project' traffic forecasts with diversion routes in place. Delay at major junctions would be included using the key junctions identified in the Transport Assessment and the results presented in it.

A8.2.5.4 Both an AM and PM weekday (Monday to Friday) peak hour would be assessed for each diversion. Both directions would be assessed where the diversion is bi-directional. Peak hours would be determined based on available assessment data.

A8.2.5.5 Criteria to assess the magnitude of change of changes in journey times are presented in Table A8.2.6.

Table A8.2.6 Criteria for magnitude of assessment for change in journey times

Change in traffic flows	Magnitude
A change in peak hour journey times in excess of 90% for a period exceeding 4 weeks in any 12-month period	Large
A change in peak hour journey times of between 60% and 90% for a period exceeding 4 weeks in any 12-month period	Medium
A change in peak hour journey times of between 30% and 60% for a period exceeding 4 weeks in any 12-month period	Small
A change in peak hour journey times of up to 30% for a period exceeding 4 weeks in any 12-month period	Negligible

A8.2.5.6 An assessment of public transport would also be completed. The method for this assessment would replicate the method used for the assessment of journey times

for general traffic, but with the value/ sensitivity assumed to be High. This is on the basis that passengers on buses are very sensitive to change. Also that bus routes have little capacity to accommodate a change while maintaining a consistent level of service.

A8.2.5.7 Changes in journey times for cyclists are not likely to be significant. Therefore, a methodology for their assessment is not provided here.

A8.2.5.8 The assessment for public transport would use the criteria for magnitude set out in Table A8.2.6.

Collisions and Safety

A8.2.5.9 There is limited guidance on the assessment of collisions and safety for EIA. On the basis that there would be no diversions lasting more than three days, there are not likely to be significant effects to traffic flows. This means that it is not practicable to assess the effects on collisions and safety based on changes in traffic flows.

A8.2.5.10 The approach would therefore be qualitative. It would consider likely changes in traffic speeds and driver behaviours that may result from changes in the operation of the traffic network (for example increased congestion). In particular, effects at collision clusters would be considered.

A8.2.5.11 Traffic data obtained from publicly available DfT information would be used for the period 1 January 2012 to 31 December 2016. It is currently proposed that collision clusters would be identified using the criteria in Table A8.2.7. A collision cluster is four Personal Injury Collisions (PICs) within 50 metres during a five-year period.

A8.2.5.12 Once clusters have been identified they would be reviewed to check that they are correct (e.g. all located around a common junction). Within urban areas a 50 metre area can lead to clusters incorporating spurious collisions.

A8.2.5.13 The significance of effects would be assessed using the change in average daily traffic based on the thresholds established in Table A8.2.7.

Table A8.2.7 Criteria for magnitude of assessment for collision and safety

Change assessed at collision cluster location	Magnitude
A change in collision numbers likely to be more than 90% or severity of existing collisions likely to change by more than 90%.	Large
A change in collision numbers of between 60% and 90% or severity of existing collisions likely to change by between 60% and 90%.	Medium
A change in collision numbers of between 30% and 60% or severity of existing collisions likely to change by between 30% and 60%.	Small
A change in collision numbers not likely to be more than 30% or severity of existing collisions not likely to change by more than 30%.	Negligible

Committed Developments and Cumulative Effects

A8.2.5.14 A review of comparative projects indicates that in all cases the assessment of inter-development cumulative effects for traffic and transport issues was qualitative. In some instances, background traffic growth was largely or wholly considered through the use of National Transport Model (NTM). This was extracted using TEMPro software, with no development specific information being used. Committed developments used for the assessment of comparative projects were identified through consultation with stakeholders by the project teams for those projects. This resulted in a small number of large developments being identified for each project.

A8.2.5.15 Based on the review of previously consented schemes it is proposed to use NTM traffic growth factors. These would be obtained through TEMPro software, for background traffic growth. This would vary by district along the route. Committed development would not be explicitly included within background traffic growth. The Transport Assessment and the technical note for Traffic and Transport effects within the ES would not include specific committed developments.

A8.2.5.16 For the assessment of Traffic and Transport effects within the Cumulative Effects chapter of the ES, committed developments would only be assessed where they are agreed with stakeholders. This would be based on information available at the time of the assessment. This would be a qualitative assessment.

Likely Engagement Approach

A8.2.5.17 Engagement on transport matters would be undertaken with highway authorities. It is anticipated that this would include:

- Highways England;
- Transport for London; and
- London Borough of Hounslow and Hampshire and Surrey County Council highway authorities.

A8.2.5.18 This would include assessment of environmental effects and the performance of the transport network during construction of the Project.

A8.2.6 Summary Scope for the EIA

A8.2.6.1 Table A8.2.8 presents a summary of the topics of potential significance for the EIA.

Table A8.2.8 Matters of significance for transport effects

Matter / potential effects	Locations	Comments
Construction		
Traffic flows	Rural	Not significant. Diversions that may result in changes in traffic flows are short term.
Journey times	Rural	Not significant. Diversions that may result in changes in journey times are short term.

Matter / potential effects	Locations	Comments
Collisions and safety	Rural	Not significant. Diversions that may result in changes in collisions are short term.
Severance and Pedestrian delay	Around rural work sites	Not significant. Pedestrian diversions would be of short duration and affect few people.
Traffic flows - total	Urban	Not significant. Diversions typically not more than three days.
Traffic flows - HDVs	Urban	Not significant. Diversions typically not more than three days.
Journey times - private motor vehicles	Urban	Potentially significant. Changes resulting from traffic management may be of large magnitude.
Journey times - buses	Urban	Potentially significant. Changes may be of large magnitude. Public transport users are particularly sensitive to change.
Journey times - cycling	Urban	Not significant. Traffic management (temporary traffic signals) anticipated to have minimal effects.
Collisions and safety	Urban	Potentially significant. Potential for large changes in traffic flows through collision cluster sites means that there is potential for an increase in collisions.
Severance and Pedestrian delay	Around urban work sites	Not significant. Pedestrian diversions would be of short duration.
Operation		
-	Whole pipeline	Not significant. Not more than one vehicle per day at any one location on average.

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Appendix 8.3
Noise and Vibration

Scoping Report Volume 1

Esso

JACOBS

Contents

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A8.3 Noise and Vibration

A8.3.1 Introduction

A8.3.1.1 This Technical Note considers the potential for the following activities to give rise to noise and vibration effects:

- Construction activity within the Order Limits (described in Chapter 3 Description of the Development), including construction compounds, site haul routes, and trenchless crossings;
- Construction vehicle movements on public highways; and
- The operation of the pipeline, including normal pumping operation, commissioning, maintenance, and inspection.

A8.3.1.2 The likely effects associated with each of these on human receptors (i.e. dwellings, schools, hospitals, places of worship, recreational areas, and other noise-sensitive locations) are considered within this Technical Note and in Chapter 13 People and Communities.

A8.3.1.3 Effects of noise and vibration on other receptors are considered in the following chapters:

- Chapter 7 Biodiversity - ecological receptors within designated sites; and
- Chapter 9 Historic Environment - historic receptors such as listed buildings and Registered Parks and Gardens.

A8.3.1.4 This Technical Note was written by a technical expert in the field of environmental noise and vibration currently employed by Jacobs. He has over 16 years' experience in the consultancy sector, and has been a member of the Institute of Acoustics since 2003.

A8.3.2 Legislation and Policy Requirements

Legislation

A8.3.2.1 A summary of the relevant legislation, policy, guidance and standards that are relevant to the noise and vibration assessments is provided below.

Environmental Protection Act 1990

A8.3.2.2 Chapter 43 of the Environmental Protection Act 1990 (EPA) requires improved control of pollution, including noise, arising from industrial, commercial or other activities. The EPA improves and extends the Control of Pollution Act 1974 (CoPA); it restates the law defining statutory nuisances and improves the summary procedures for dealing with them.

Control of Pollution Act 1974

A8.3.2.3 Section 60 of CoPA grants the power to a local authority to serve a notice on a developer or contractor imposing restrictions on construction works. Conditions may be imposed at any time and without prior warning or consultation, although it is usual for local authorities to engage with developers prior to serving a notice.

A8.3.2.4 Section 61 of CoPA describes the process of applying to the local authority for prior consent in relation to noise from construction works. An application for consent under

Section 61 typically includes detailed information on the construction process, including a programme of activities, method statements, type and number of plant, hours of operation, calculated noise levels, and steps proposed to be taken to control noise resulting from the works.

A8.3.2.5 Consent is granted based on the exact details provided in the application. Provided that the operation of the construction site is as described in the application, the local authority cannot serve a Section 60 notice.

National Policy Statements and Guidance

National Policy Statements - Energy

A8.3.2.6 National Policy Statement (NPS) EN-1 sets out overarching national policy guidance on nationally significant energy projects. It is the primary policy for applications for development consent under the Planning Act 2008. Section 5.11 of NPS EN-1 sets out the generic considerations to be given to the impacts of noise and vibration.

A8.3.2.7 Further specific noise and vibration guidance applicable to the construction and operation of gas and oil pipelines is provided in Section 2.20 of NPS EN-4

A8.3.2.8 Whilst EN-1 and EN-4 remain the prime decision making documents, where they do not provide guidance, the following may also be considered important and relevant guidance that may require consideration by the decision making authority. At this stage it is not possible to confirm if such secondary guidance will be considered important or relevant by the Secretary of State and it is included for completeness to allow the Secretary of State to make such a determination.

National Planning Policy Framework

A8.3.2.9 The National Planning Policy Framework (NPPF), March 2012, sets out the Government's planning policies for England and how these are expected to be applied. The NPPF sets out the Government's requirements for the planning system, which may be relevant, although the NPSs have primacy under the Planning Act 2008. In respect to noise, the NPPF states that planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise. Existing businesses wanting to develop should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

A8.3.2.10 The NPPF refers to the Noise Policy Statement for England for definitions of significance.

The Noise Policy Statement for England, 2010

A8.3.2.11 The Noise Policy Statement for England, 2010 provides explanation of the term 'significant adverse impact' from the NPPF. The document also defines the meanings of the terms No Observed Effect Level (NOEL), Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL).

Planning Practice Guidance

A8.3.2.12 Additional guidance to the NPPF is set out in Planning Practice Guidance, which sets out how planning can manage potential noise impacts in new development. It advises that planning authorities should take account of the acoustic environment and in doing so consider:

- whether or not a significant adverse effect is occurring or likely to occur;
- whether or not an adverse effect is occurring or likely to occur; and
- whether or not a good standard of amenity can be achieved.

A8.3.2.13 PPG states that these potential effects should be evaluated by comparison with the SOAEL and the LOAEL for the given situation.

British Standards

A8.3.2.14 Various British Standards provide relevant guidance on the quantification, prediction and management of noise. The noise and vibration assessment would consider the standards set out below:

- British Standard 5228-1:2009+A1:2014 'Noise and vibration control on construction and open sites. Part 1 - Noise' (BSI, 2014) provides noise source levels for typical construction equipment and calculation methods to determine construction noise levels at distance. It would be used for all construction noise calculation and assessment.
- BS 5228-2:2009+A1:2014 'Noise and vibration control on construction and open sites. Part 2 – Vibration' (BSI, 2014) contains guidance on construction vibration and its effect on buildings and people. It provides a prediction methodology for mechanised construction works, such as compaction and tunnelling works. The standard also presents guidance for the control of vibration from construction works. Assessment of the likelihood of significant effects as a result of ground-borne vibrations, would be carried out using the guidance contained within the standard.
- British Standard 7385-2:1993 'Evaluation and measurement for vibration in buildings' (BSI, 1993) gives guidance on the levels of vibration above which building structures could be damaged.
- British Standard 6472:1992 'Evaluation of human exposure to vibration in buildings [1 Hz to 80 Hz]' (BSI, 1992) gives guidance on the levels of vibration within building that give rise to human response.

Other Relevant Guidance

A8.3.2.15 A number of government departments and Non-Governmental Organisations (NGOs) have published noise and vibration guidance. The following are relevant to the noise and vibration assessments:

- 'Calculation of Road Traffic Noise' (CRTN) (Department for Transport and the Welsh Office, 1988) - used for the calculation and measurement of road traffic noise.
- 'Design Manual for Roads and Bridges' (DMRB) Part 7, Volume 11, Section 3 (HD 213/11 - Revision 1) (Highways Agency, 2011) Noise and Vibration - used to define boundaries for the likely effect of increases in traffic noise levels.
- Acoustic design of schools: performance standards. Building bulletin 93 (BB93) (Department for Education and Education Funding Agency, 2015) - defines suitable indoor noise levels for a number of different educational activities and environments.
- The Department of the Environment (DoE) Leaflet AL72: Noise Control on Building Sites (DoE, 1976) (out of print) - provides some guidance on acceptable levels of construction noise. It is still relevant and is referenced within BS5228-1:2009+A1:2014.
- World Health Organization 'Guidelines for Community Noise' (WHO, 1999) - provides guidance on acceptable internal and external noise levels in buildings and outdoor living areas.
- World Health Organization 'Night Noise Guidelines for Europe' (WHO 2009) - reviews health effects associated with exposure to night-time noise and recommends guideline values.

A8.3.3 Baseline Conditions

A8.3.3.1 Baseline noise levels are likely to vary along the pipeline route as it passes through a variety of rural and urban settings. The main factors that affect baseline noise levels are expected to be as follows:

- Higher noise levels would be expected at locations closer to transport infrastructure and industrial activity;
- Diurnal patterns - higher noise levels would be expected at times of peak transport activity and lowest at night; and
- Meteorological conditions – noise levels would be at their lowest in the absence of wind and rain.

A8.3.3.2 Baseline noise or vibration surveys at receptors along the pipeline route or relevant public highway routes are not proposed for the following reasons:

- The proposed pipeline is a replacement for an existing pipeline. There are no new proposed sources associated with the Project that could have an operational noise effect. Therefore, there would be no aspects of the Project that require assessment using BS 4142:2014 (BSI, 2014), and no requirement to determine the background noise levels.
- There are no new proposed sources of ground borne vibration associated with the Project that could have an operational effect.
- The proposed method for the assessment of construction noise is based on Annex E2 of BS 5228-1:2009+A1:2014 (BSI, 2014). This approach is based on absolute

thresholds, rather than those set in relation to ambient noise levels. Therefore, existing ambient noise levels are not required to inform the assessment of construction noise.

- The assessment of site construction vibration effects is based on fixed thresholds detailed in BS5228-2:2009+A1:2014 (BSI, 2014). Therefore, baseline vibration levels are not required to inform the assessment of construction vibration.
- The assessment of noise and vibration associated with construction-related traffic on public highways is based on a comparison of the traffic without the Project against the traffic with the additional construction vehicles. Therefore, baseline noise levels are not required to inform the assessment of construction-related traffic on public highways.

Likely Significant Effects

A8.3.3.3 Decommissioning activities would be subject to an appropriate decommissioning strategy, as outlined in Chapter 3 Description of the Development. It is not practical to assess the effects of decommissioning at this stage as the methodology and likely good practice mitigation measures will not be defined until closer to the time, at least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

Construction-Related Traffic on Public Highways

A8.3.3.4 This Scoping exercise is based on construction scenario assumptions. These are consistent with other chapters in this report and are presented within Table A8.2.3 within the Traffic and Transportation Technical Note (Appendix 8.2). Construction vehicle traffic movements on public highways during the construction works would be associated with the following:

- Delivery of sections of pipe, plant, machinery, welfare and other construction materials using heavy vehicles. These deliveries would be made at discrete access points along the route.
- Daily access to and from site compounds by construction workers in light vehicles.

A8.3.3.5 The greatest potential for adverse noise effects due to construction vehicle movements is along rural roads with low baseline traffic flows.

A8.3.3.6 The expected total vehicle movements have been taken from Table A8.2.4 within the Traffic and Transportation Technical Note (Appendix 8.2). Movements associated with the construction of the pipeline (excluding staff movements) in a rural area would be a total of 668 heavy vehicles (i.e. 334 in and 334 out) and 194 light vehicles (i.e. 97 in and 97 out). This is based on pipeline Section A.

A8.3.3.7 During construction in rural areas there would be expected to be a workforce of up to 10 staff per crew at any one location. Assuming that for commuting, construction workers would lift share with an average of two workers per vehicle and do not leave the site during the day, there would be an additional daily light vehicle trip generation of 10 per crew.

A8.3.3.8 Assuming that eight work fronts are working at the same time in a rural area, when combined with the construction traffic, this is equivalent to an additional 24 heavy vehicle movements and 88 light vehicle movements per day. These would be

distributed across approximately nine access points along the 20 km section length. Therefore, the average increase in vehicle movements on an individual road link near an access point would not be expected to exceed 4 heavy vehicles and 9 light vehicles per day.

A8.3.3.9 As all delivery and access routes are along routes with a daily flow greater than 50 vehicle movements per day, the additional numbers of construction related vehicles would not give rise to significant increases in noise or vibration (DMRB HD213/11).

Noise and vibration from construction related traffic on public highways are not considered to have potential significant effects

A8.3.3.10 There is expected to be a slightly greater number of construction traffic movements along urban sections of the route. However, the greater baseline flows in urban areas would mean that any increases in traffic noise due to construction traffic movements would be insignificant.

A8.3.3.11 Although there is the potential for occasional materials deliveries out of hours, these would not be regular, and would not represent a significant increase in noise in rural or urban areas.

A8.3.3.12 The analysis of anticipated construction vehicle movements indicates that no significant adverse noise or vibration effects associated with construction traffic movements are expected along public highways for any Section of the Project (Planning Inspectorate Advice Note 7 questions 3 and 7).

Noise from Construction Activity within the Construction Corridor

A8.3.3.13 Noise and vibration from construction plant activity within the construction corridor would mainly come from the following activities (which are described in further detail in Chapter 3 Description of the Development):

- Fencing;
- Topsoil Strip in rural areas;
- Breaking of hard surfaces;
- Compound preparation;
- Pipe Stringing;
- Pipe Welding;
- Excavation;
- Pipe Laying;
- Backfill;
- Compaction; and
- Reinstatement.

A8.3.3.14 The equipment associated with the above works could include tractors, hydraulically operated post drivers, dumpers, tracked excavators, telescopic handlers, lorries,

wheeled loaders, generators, hydraulic breakers, welding plant, diesel pumps, horizontal drilling rigs and vibratory rollers.

A8.3.3.15 The construction activities would not occur at the same location simultaneously. Plant associated with the excavation of the pipeline trench would operate in one area initially. These would be followed behind by the plant laying the pipe, and then the plant needed to refill the excavated material and level the new surface. Within the overall construction period, there would be days when no construction activities would be audible. Similarly, any receptor would only experience the highest construction noise levels for a limited duration within the construction period.

A8.3.3.16 The total duration of construction activities within each Section would vary. The overall works are expected to be completed at a rate of 450m per week in rural areas and 90m per week in urban areas. The construction works would be undertaken in sequence, but from a number of concurrently starting access points along the Section.

A8.3.3.17 Typical construction working hours would be from 07:00 to 19:00 Monday to Saturday (see Chapter 3 Description of the Development and Chapter 4 Design Evolution).

A8.3.3.18 During certain activities the Contractor may be required to work outside of the typical construction working hours. These activities could include:

- The delivery of pipe sections or abnormal loads;
- Some trenchless techniques (e.g. horizontal directional drilling);
- Cleaning and hydrostatic pressure testing of the pipeline; and
- Trenchless crossings.

A8.3.3.19 Contractors will be required to submit applications for Section 61 consents, variations and dispensations under the Control of Pollution Act 1974 (CoPA) for all construction activities that may generate a significant noise and/or vibration effect, including activities to be undertaken outside of core working hours, unless otherwise agreed with the relevant planning authority. Activities that typically do not require a Section 61 consent include those which do not have significant noise and vibration impact, and would occur during core working hours, such as pipe welding.

A8.3.3.20 Examples of control measures to mitigate noise and vibration impacts could be:

- avoidance of simultaneous working in close proximity to places of worship at key times such as Sundays;
- provision of construction site hoarding around a construction compound; and
- Set limits to the duration and nature of simultaneous activities

A8.3.3.21 Tables A8.3.1 and A8.3.2 present noise calculations for linear construction activities for typical rural and urban sections of the construction corridor. The calculations follow the methodology for mobile plant set out in Equation F.6 of BS 5228-1:2009+A1:2014 (BSI, 2014). The plant selection in these tables is based on engineering professional judgement and is considered to represent a realistic conservative estimate.

A8.3.3.22 Table A8.3.3 presents noise calculations for non-linear construction locations. These would include site compounds and trenchless crossing locations (as described in Chapter 3 Description of the Development). These calculations follow the

methodology for sound power sources defined in Section F.2.3.2 of BS 5228-1:2009+A1:2014 (BSI, 2014).

A8.3.3.23 Table A8.3.4 presents noise calculations for working that may need to be carried out outside the typical construction working hours.

A8.3.3.24 The estimated number of days that noise from each activity would occur at the closest receptors is provided in Table A8.3.5. Note that more than one activity may occur on any single day.

Table A8.3.1 Calculation of average daily activity noise levels (typical linear rural Sections)

Activity	Equipment										Activity LAeq @ 10m
	Project plant description	BS5228 Ref. for closest available substitute plant	L_{WA}, dB	% On-time	Corrected L_{WA}, dB	No. passages per day	Progress (m / day)	No. passages per hour	Speed (km/h)	Adjusted LAeq @ 10 m, dB	
Fencing	Tractor	C4.75	107	100	107	1	200	0.125	0.025	71	72
	Post rammer	-	113	1	93	1	200	0.125	0.025	57	
	Nail Gun	-	120	1	100	1	200	0.125	0.025	64	
Topsoil Strip	Tracked excavator 25t	C2.19	105	100	105	1	100	0.125	0.0125	72	72
Haul road preparation	Delivery dumper	C4.3	104	100	104	80	-	10	5	64	77
	Tracked excavator 7t	C4.12	105	100	105	1	50	0.125	0.00625	75	
	Roller	C5.20	103	100	103	1	50	0.125	0.00625	73	
Pipe Stringing	Tractor	C4.75	107	100	107	40	-	5	5	64	73
	Lorry	C2.34	108	100	108	1	250	0.125	0.03125	71	
	Tracked excavator 25t	C2.19	105	100	105	1	250	0.125	0.03125	68	
Pipe Welding	Welder	C3.31	101	50	98	1	50	0.125	0.00625	68	70
	Welding generator	C3.33	85	100	85	1	50	0.125	0.00625	55	
	Angle grinder	C4.93	108	5	95	1	50	0.125	0.00625	65	
Excavation	Tracked excavator 30t	C2.16	103	100	103	2	100	0.25	0.0125	73	73
Pipe Laying	Tracked excavator 30t	C2.16	103	100	103	2	90	0.25	0.01125	73	73
Backfill	Tracked excavator	C2.16	103	100	103	2	100	0.25	0.0125	73	73

Activity	Equipment										Activity LAeq @ 10m
	Project plant description	BS5228 Ref. for closest available substitute plant	L_{WA}, dB	% On-time	Corrected L_{WA}, dB	No. passages per day	Progress (m / day)	No. passages per hour	Speed (km/h)	Adjusted LAeq @ 10 m, dB	
	30t										
Compaction	Vibratory roller	C5.20	103	100	103	2	100	0.25	0.0125	73	73
Rein - statement	Tracked excavator 30t	C2.16	103	100	103	1	70	0.125	0.00875	72	77
	Tractor	C4.75	107	100	107	1	70	0.125	0.00875	76	

Table A8.3.2 Calculation of average daily activity noise levels (typical linear urban Sections)

Activity	Equipment										Activity LAeq @ 10m
	Project plant description	BS5228 Ref. for closest available substitute plant	L_{WA}, dB	% On-time	Corrected L_{WA}, dB	No. passages per day	Rate of Progress (m / day)	No. passages per hour	Speed (km/h)	Adjusted LAeq @ 10 m, dB	
Trial holes	Saw	C4.73	112	10	102	1	18	0.125	0.00225	76	81
	Breaker	C1.6	111	25	105	1	18	0.125	0.00225	79	
Main laying	Saw	C4.73	112	25	106	1	18	0.125	0.00225	80	84
	Hydraulic breaker	C5.1	116	10	106	1	18	0.125	0.00225	80	
	Tracked excavator	C5.11	101	100	101	1	18	0.125	0.00225	75	
	Dumper (removal)	C4.3	104	100	104	8	18	1	5	54	
	Dumper (bedding)	C4.3	104	100	104	8	18	1	5	54	
	Pipe delivery lorry	C2.34	108	100	108	1	18	0.125	5	49	
Pipe welding	Welder	C3.31	101	50	98	1	18	0.125	0.00225	72	74
	Welding generator	C3.33	85	100	85	1	18	0.125	0.00225	59	
	Angle grinder	C4.93	108	5	95	1	18	0.125	0.00225	69	
Backfill	Dumper	C4.3	104	100	104	12	18	1.5	5	56	85
	Trench rammer	-	108	100	108	2	18	0.25	0.00225	85	
Rein - statement	Saw	C4.73	112	10	102	1	18	0.125	0.00225	76	86
	Whacker plate	C5.29	110	50	107	1	18	0.125	0.00225	81	
	Vibratory roller	C5.22	109	50	106	1	18	0.125	0.00225	80	
	Delivery lorry	C2.34	108	25	102	2	18	0.25	0.00225	79	

Table A8.3.3 Calculation of average daily activity noise levels (typical site compounds and trenchless locations)

Activity	Equipment							Activity LAeq @ 10m
	Project plant description	BS5228 Ref. for closest available substitute plant	L_{WA}, dB	% On-time	Corrected L_{WA}, dB	No. Plant items	Adjusted LAeq @ 10 m, dB	
Site compound construction	Tracked excavator 25t	C2.19	105	100	105	1	77	80
	Delivery lorry for geotextile material	C2.34	108	10	98	1	70	
	Rolling and compaction	C5.22	109	25	103	1	75	
Site compound operation	Generator for site cabins	C4.78	94	100	94	1	66	78
	Lorry for delivery of materials	C2.34	108	10	98	1	70	
	Dumper for movement of materials	C4.3	104	50	101	1	73	
	Excavator for movement of materials	C2.19	105	50	102	1	74	
Horizontal drilling / micro tunnelling	Generator for site cabins	C4.78	94	100	94	1	66	84
	Excavation of pit	C2.16	103	50	100	1	72	
	Excavator for assisting on pullback	C2.19	105	50	102	1	74	
	Dumper for movement of materials	C4.3	104	10	94	1	66	
	Drilling equipment	C3.15	110	100	110	1	82	
	Generator for drill	C4.96	105	100	105	1	77	
Road Crossings	As described in Table A8.3.2							

Table A8.3.4 Calculation of average activity noise levels (typical out of hours working)

Activity	Equipment							Activity LAeq @ 10m
	Project plant description	BS5228 Ref. for closest available substitute plant	L_{WA}, dB	% On-time	Corrected L_{WA}, dB	No. Plant items	Adjusted LAeq @ 10 m, dB	
Out of hours deliveries at compounds	Generator for site cabins	C4.78	94	100	94	1	66	77
	Lorry for delivery of materials	C2.34	108	25	102	1	74	
	Dumper for movement of materials	C4.3	104	40	100	1	72	
Horizontal drilling / micro tunnelling	Generator for site cabins & lighting	C4.78	94	100	94	1	66	84
	Excavator for assisting on pullback	C2.19	105	50	102	1	74	
	Dumper for movement of materials	C4.3	104	10	94	1	66	
	Drilling equipment	C3.15	110	100	110	1	82	
	Generator for drill	C4.96	105	100	105	1	77	
Hydrostatic pressure testing	Pump	C11.1	109	100	109	1	81	81
	Generator for pump	C4.78	94	100	94	1	66	

Table A8.3.5 Estimated number of days that noise could occur at closest receptors

Location	Activity	Number of days/month
Rural	Fencing	2
	Topsoil Strip	2
	Haul road preparation	10
	Pipe Stringing	3
	Pipe Welding	3
	Excavation	3
	Pipe Laying	1
	Backfill	2
	Compaction	2
	Reinstatement	3
Urban	Each linear activity	3
Site Compound (construction)	Construction	3
Site Compound (operation)	Operation	20
Trenchless crossing drive sites	Horizontal drilling / micro tunnelling	20

A8.3.3.25 Based on the estimated activity noise levels, Table A8.3.6 presents maximum distances at which significant effects could occur for works during normal working hours. The distances have been calculated based on various conservative factors, including the following:

- A direct line of sight between receptors and construction activities has been assumed. This is particularly conservative for urban locations, where a direct line of sight between receptors and construction activities over large distances is unlikely.
- Calculated monthly average noise levels are based on conservative estimates of the duration of each activity.
- Average noise levels have been calculated based on works being undertaken over an eight-hour day, which results in a conservative estimate.
- Calculated monthly average noise levels are based on all construction activity occurring within one month. This is unlikely to occur in practice and is a conservative estimate (e.g. the estimated duration of works for Section A is 24 weeks).

Table A8.3.6 Maximum distances at which significant construction noise effects could occur during normal working hours

Activity location type	Rural		Urban	
	Residential receptors	Educational, religious, health, and other noise sensitive community facilities	Residential receptors	Educational, religious, health, and other noise sensitive community facilities
Linear sections	50m	160m	55m	545m
Site compounds	65m	190m	65m	615m
Trenchless crossings drive site	85m	220m	70m	625m

A8.3.3.26 Table A8.3.7 presents the maximum distances at which significant construction noise effects could occur for works outside normal working hours. There is potential for these activities to be undertaken at night in certain specific circumstances. The values in the table are therefore the maximum distances where significant sleep disturbance effects could occur. They represent conservative and precautionary estimates for a night (rather than a monthly average) for each activity.

Table A8.3.7 Maximum distances at which significant construction noise effects could occur outside normal working hours

Activity location type	Distance
Deliveries at compounds	375m
Trenchless crossing drive sites	875m
Hydrostatic pressure testing	640m
Road Crossings	1100m

A8.3.3.27 In the event that noise from construction activities at two simultaneous work fronts occur during the same day or night at a particular receptor, short term construction noise level could be temporarily elevated. As simultaneous working on a particular day would not affect monthly average noise levels, this would not affect the distances at which significant construction noise effects would be deemed to occur.

A8.3.3.28 However, in recognition of the potential for short term elevated noise levels due to works at simultaneous work fronts, the distances set out in Table A8.3.8 and A8.3.9 shall generally be maintained between work fronts. If multiple work fronts need to undertake work simultaneously within these distances, and where so required under the DCO, the contractor shall demonstrate that that there would not be any worsening of any significant noise and vibration effects identified in the ES.

Table A8.3.8 Distances between simultaneous work fronts during normal working hours

Activity location type	Rural		Urban	
	Residential receptors	Educational, religious, health, and other noise sensitive community facilities	Residential receptors	Educational, religious, health, and other noise sensitive community facilities
Linear sections	200m	640m	220m	2180m
Site compounds	100m	180m	60m	180m
Trenchless crossing drive sites	200m	360m	120m	360

Table A8.3.9 Distances between simultaneous work fronts outside normal working hours

Activity location type	Distance
Deliveries at compounds	1500m
Trenchless crossing drive sites	3500m
Hydrostatic pressure testing	2560m
Road Crossings	4400m

Significant construction noise during normal operating hours could occur within the maximum distances shown in Tables 8.3.6

Vibration from Construction Activity within the Construction Corridor

A8.3.3.29 The guideline vibration thresholds from BS 5228-2:2009+A1:2014 (BSI, 2014), have been used to define the significance of construction vibration. The adopted threshold of significance for continuous vibration within buildings is a peak particle velocity of 1.0 mm/s.

A8.3.3.30 Predicted levels of “steady state” vibration from the use of vibratory rollers during the compaction works indicate that a level of 1.0 mm/s could occur at a maximum distance from a roller of approximately 60m. Compaction work would only occur along the line of the pipeline (not across the width of the construction corridor). Therefore, significant vibration effects from compaction could only occur within 60m of the pipeline route.

Vibration from compaction activity in rural locations would only be significant within 60m from the line of the pipeline.

Vibration from Trenchless Crossings

A8.3.3.31 During certain activities at trenchless crossings (e.g. Auger bore and HDD), there is the potential for vibration effects at nearby receptors. These activities are considered likely to generate similar levels of vibration to rotary bored piling, due to the similar mechanisms involved.

A8.3.3.32 Empirical data presented in Table D.6 of BS5228: Part 2: 2009+A1:2014 suggests that vibration from rotary bored piling activities falls to below 1.0 mm/s at a distance of approximately 10 - 15 metres.

A8.3.3.33 Vibration levels beyond a distance a distance of 20m from trenchless crossings are therefore not considered to have potential for significant effects. This distance has been selected to account for the potential difference in vibration generation between proposed trenchless techniques and rotary bored piling.

Vibration levels beyond a distance a distance of 20m from trenchless crossings are not considered to have potential for significant effects.

Noise and Vibration During Operation

A8.3.3.34 Information regarding noise outputs from the existing pipeline and other similar facilities around the UK has been used. The following operations are not known to generate noticeable levels of noise or vibration during operation for above ground receptors:

- The flow of aviation fuel along buried pipeline. The pipeline would be designed and operated in accordance with industry good practice. This would ensure that pipeline walls are suitably rigid, and that fluid flow within the pipeline would be smooth enough that vibration issues associated with turbulent flow would be avoided. There have been no known instances of perceptible noise or vibration above ground due to the flow of aviation fuel along buried pipelines operated by the developer.
- A new pigging station, as described in Chapter 3 Description of the Development, would be installed in the vicinity of Boorley Green. This would house a receiving and launching facility for PIGs (as described in Chapter 3 Description of the Development). The movement of PIGs along buried pipelines, and the entry or exit of PIGs at pigging stations is a quiet activity with no noticeable noise above ground. Over the lifetime of the existing pipeline, there have been no known instances of perceptible noise or vibration above ground due to pigging operations.
- The operation of valves. All valves would be located within below ground level chambers, and would not give rise to perceptible levels of noise or vibration above ground.
- Above ground installations include a new pigging station at Boorley Green, valves cabinets (Chapter 3). The pumping station at Alton may be upgraded and modernised as part of the Project. There have been no historic noise issues associated with the existing pumping station.

Noise and vibration during operation are not considered to have potential for significant effects

A8.3.3.35 Therefore, for these reasons, no significant adverse noise or vibration effects are expected during operation of the pipeline (Planning Inspectorate Advice Note 7 questions 3 and 7).

Impact Assessment Methodology

Construction Noise

A8.3.3.36 As described in Chapter 6 Impact Assessment Methodology, the assessments would consider both the magnitude of the change and sensitivity of the receptors.

A8.3.3.37 It is proposed to adopt the magnitudes presented in the Table A8.3.10:

Table A8.3.10 Magnitude of change

Magnitude of change	Criteria
Large	Exceedance of relevant threshold by 5dB or greater
Medium	Exceedance of relevant threshold by less than 5dB
Small	Compliance with relevant threshold by less than 5dB
Negligible	Compliance with relevant threshold by greater than 5dB

A8.3.3.38 Based on the principles described in Annex E.2 of BS 5228-1:2009+A1:2014 (BSI, 2014), the relevant noise thresholds would be the values in Table A8.3.11. The calculated noise level would be compared to the relevant external threshold to derive the magnitude of change.

A8.3.3.39 For daytime construction noise, the magnitude of change would be the highest monthly average over the construction works. For night time construction noise, the magnitude of change would be based on the noisiest night during the construction works.

A8.3.3.40 All noise values presented in Table A8.3.11 are free-field values.

Table A8.3.11 Adopted thresholds for construction noise impacts

Receptor type	Period	Relevant external threshold dB $L_{Aeq,T}$	Source
Residential receptors in rural and suburban locations	Day	70	BS 5228-1:2009+A1:2014 Annex E.2 / AL72
Residential receptors in urban areas	Day	75	BS 5228-1:2009+A1:2014 Annex E.2 / AL72
Educational, religious, health and other noise sensitive community facilities	Day	65	Lower daytime threshold from example method presented in BS 5228-1:2009+A1:2014 Annex E.3.3.
Industrial / commercial/retail	Day	75	BS 5228-1:2009+A1:2014 Annex E.2 / AL72

Receptor type	Period	Relevant external threshold dB $L_{Aeq,T}$	Source
Receptors used for sleeping (e.g. residential, hospitals, hotels)	Night	45	Lower night time threshold from example method presented in BS 5228-1:2009+A1:2014 Annex E.3.3.

A8.3.3.41 The different sensitivities of the above receptor types are accounted for through the adoption of the thresholds in Table A8.3.11. When determining the significance of effects using the procedure outlined in Chapter 6 Impact Assessment Methodology, all human receptors would be considered to have medium sensitivity.

A8.3.3.42 As described in the NPSE, the thresholds in Table A8.3.11 would be adopted as the SOAEL at residential receptors. These values are considered to represent the onset of significant impacts on health and quality of life (given the temporary and short term nature of the construction works).

A8.3.3.43 The values adopted as the LOAEL at all human receptors would be an average daily outdoor level of 50 dB LAeq. This is the level that relates to the onset of 'moderate annoyance', according to the World Health Organization Guidelines for Community Noise (WHO, 1999). For night time noise, a LOAEL of 40 dB LAeq,8h would be adopted. It is not considered that there would be any noticeable change in quality of life at levels below this value, given the temporary nature and expected overall duration of the construction works.

A8.3.3.44 Construction noise levels would be calculated at different distances for each of the various construction activities, in accordance with the procedures outlined in BS 5228-1:2009+A1:2014 (BSI, 2014). As the activities would steadily progress along the construction corridor, the calculations would use the method for mobile plant defined in Section F2.5 of BS 5228-1:2009+A1:2014 (BSI, 2014). These calculations would take the following into account:

- Type of plant for each type of construction activity;
- Number of vehicles movements/passages per hour; and
- Speed of plant movement.

A8.3.3.45 The number of sensitive receptors with each magnitude of effect would be calculated and used to describe the overall significance of the Project. It is proposed to present noise assessment results for groups of receptors in distance bands from the route, rather than at individual receptors.

Construction Vibration

A8.3.3.46 The assessment thresholds would be based on relevant guidance within BS 5228-2:2009+A1:2014 (BSI, 2014) for building damage and human response. These are based on thresholds in BS 7385:1993 (BSI, 1993) and BS 6472-1:2008 (BSI, 2008).

A8.3.3.47 The adopted threshold of significance for continuous vibration within buildings would be a peak particle velocity of 1.0 mm/s. The effect at this level is described in BS 5228-2:2009+A1:2014 (BSI, 2014) as follows: "It is likely that vibration of this level in

residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents".

A8.3.3.48 Where works with the potential to give rise to significant levels of ground borne vibration are proposed (e.g. horizontal drilling or ground compaction using rotary plant), then the levels of vibration at receptors would be estimated based on BS 5228-2:2009+A1:2014 (BSI, 2014)

A8.3.3.49 Other items of surface plant are not recognised as sources of high levels of environmental vibration. They would be expected to generate vibration levels well below those at which cosmetic building damage is predicted to occur, or where it is likely that vibration in residential environments would result in complaints. Therefore, it is not proposed to undertake a quantitative assessment of vibration from other items of surface plant.

Summary

A8.3.3.50 Table A8.3.12 presents a summary of matters of potential significance for the EIA.

Table A8.3.12 Matters of significance for noise and vibration effects

Matter / potential effect	Locations	Comments
Noise from site construction activity	Urban and rural areas	Potential for significant effects at urban locations and for rural receptors within distances shown in Tables A8.3.6 and A8.3.7.
Vibration from ground compaction	Buildings/ structures and humans	Potential for significant effects at receptors within 60m of route.
Vibration from trenchless construction	Buildings/ structures and humans	Potential for significant effects at receptors within 20m from trenchless crossings
Noise and vibration from construction vehicles on public highway	All receptors	Not significant. The addition of construction related traffic is not expected to give rise to a perceptible increase.
Noise and vibration from operation of pipeline	All receptors	Not significant. Due to underground location of pipeline and the absence of new noisy above ground facilities there is no potential for significant adverse effects.

Appendix 8.4
Equality Impacts

Scoping Report Volume 1

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A8.4 Equality Impacts

A8.4.1 Introduction

A8.4.1.1 This technical note considers the potential for the Project to affect people with 'protected characteristics' (as set out in the Equality Act 2010) and those within socio-economically deprived communities. Protected characteristics consist of personal characteristics such as age, disability, sex, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion or belief, and sexual orientation.

A8.4.1.2 This assessment explores possible ways that the Project could disproportionately affect people with 'protected characteristics' and/or those within deprived communities to a greater degree than those in the general population. It also investigates whether such cohorts would be affected in a particular way, or differently, compared to individuals within the wider population pool. This assessment is referred to as an Equality Impact Assessment (EqIA).

A8.4.1.3 This technical note was written by a technical expert in the field of Equality Impact currently employed by Jacobs. She has 16 years' experience in the consultancy sector and 5 years in academia. Her qualifications include a BA in Natural Science and an MSc in Ecological Economics. She is also a full member of the Chartered Institution of Water and Environmental Management.

A8.4.2 Legal and Policy Requirements

A8.4.2.1 National legislation and planning policies relevant to potential impacts on equality are outlined below.

Legislation

Equality Act 2010

A8.4.2.2 The Equality Act 2010 consolidates previous legislation in relation to discrimination. This protects people from discrimination in the workplace and in wider society. In addition, the Equality Act 2010 introduced a Public-Sector Equality Duty (PSED). This requires public bodies to have regard for the need to:

- eliminate discrimination;
- advance equality of opportunity; and
- foster good relations between people who share defined protected characteristics and people who do not.

A8.4.2.3 Protected characteristics as defined in the Equality Act 2010 are outlined above in Section 1.1.

A8.4.2.4 Duties specific to the public sector in England are outlined in the Equality Act 2010 (Statutory Duties) Regulations 2011. These require public bodies to:

- undertake assessments of the likely impact of proposed policies and practices on people with protected characteristics;
- publish and review strategic equality plans; and

- carry out stakeholder and community engagement on equality issues.

A8.4.2.5 Esso is not a public body and is not bound by the PSED requirements of the Equality Act 2010 (Statutory Duties) Regulations 2011. However, the Secretary of State (SoS) is and must have regard to the PSED requirements in determining the outcome of the application for development consent. As such, an EqIA would provide the SoS with relevant information to assist in their determination.

Policy

A8.4.2.6 NPS EN-1: The Overarching National Policy Statement for Energy (EN-1) states that, for proposals subject to the European EIA Directive, Environmental Statements should set out likely significant adverse effects. At paragraph 4.2.2, the NPS states that this information "could include matters such as… equality, community cohesion and well-being" (DECC, 2011).

A8.4.2.7 NPS EN-4: The National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines does not specifically refer to equality. However, it would still be relevant due to the nature of the Project (DECC, 2011b).

A8.4.3 Baseline Conditions

A8.4.3.1 An independent and specific account of existing baseline conditions for the EqIA would be obtained during the EIA and presented in the ES. To support this scoping assessment, the 'People and Communities' and 'Health' Chapters within this Scoping Report have been reviewed. They are considered to outline a suitable baseline on which to base the EqIA Scoping. The EqIA baseline would be used to assess whether the Project would result in disproportionate or deferential effects on people with protected characteristics.

A8.4.4 Potential Effects

A8.4.4.1 The EqIA considers effects of the Project's construction and operational phases on protected characteristic groups.

A8.4.4.2 Decommissioning activities would be subject to an appropriate decommissioning strategy, as per Chapter 3. It is not practical to assess the effects of decommissioning at this stage as the methodology and good practice mitigation measures will not be defined until closer to the time, likely to be at least 60 years from now. As such, the effects of decommissioning will be scoped out of this assessment.

A8.4.4.3 The following aspects are likely to be areas where activities associated with the Project have the potential to affect people with protected characteristics:

- construction related environmental impacts (i.e. noise, air quality, visual, etc.); and
- effects of severance/changes in access associated with construction activities. This would include any preparation works, curtailment of pathways and roadways, presence of construction traffic and heavy goods vehicles (HGVs), etc.

A8.4.4.4 There are not anticipated to be any aspects of the Project once it is operational with the potential to affect people with protected characteristics. It will be buried underground other than a limited number of small above ground installations.

A8.4.5 Impact Assessment Methodology

A8.4.5.1 An EqIA is not required to follow a specific process in establishing or determining the assessment of impacts.

A8.4.5.2 The EqIA will consider significant effects identified within the assessments in the ES topic chapters (People and Communities, etc.). It would not use the same assessment process as used in ES chapters, nor would it contain any assessment of significance. The test applied in the EqIA would be whether the residual significant effects identified in the topic chapters would affect people disproportionately or differentially (in a different way) from the general population. This would include people with protected characteristics or from socio-economically deprived communities.

A8.4.5.3 Such effects are reported as either disproportionate or differential as follows:

- A disproportionate equality effect is one where people sharing a protected characteristic make up a greater proportion of the affected population than in the wider study area. For example, where there is a very high proportion of elderly people in a particular community compared with the wider area as a whole. Disproportionate effects would also occur where an effect is predicted on a community resource mainly used by people sharing protected characteristics. For example, primary schools are mainly used by children.

- A differential equality effect is one that affects members of a protected characteristic group differently from the rest of the general population. This could be because of their specific needs, or a recognised sensitivity or vulnerability associated with their protected characteristic. For example, disabled persons may have more difficulty than other people in adapting to new or revised pedestrian routes during construction.

A8.4.5.4 From the residual effects reported in the separate topic chapters, the EqIA would use professional judgement to determine if such effects would be ‘disproportionate’ or ‘differential’. All effects reported within the EqIA would be topical to groups of people (e.g. users of a community facility or residents of a community) and not individuals.

A8.4.6 Consultation and Engagement

A8.4.6.1 The approach would take the form of stakeholder meetings to inform the final assessment. Responses to initial consultation and engagement would help identify the list of stakeholders for such engagement.

A8.4.7 Summary of Likely Effects for the EIA

A8.4.7.1 At this stage, only decommissioning has been scoped out of the EqIA. This is because the EqIA depends on the residual effects reported within other topic chapters. EqIA effects will be reported in the People and Communities chapter of the ES.

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Appendix 9

Long List of Other Developments for Inter-development Cumulative Effects

Scoping Report Volume 1

JACOBS

A9. Long List of Other Developments for Inter-development Cumulative Effects

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
NSIP/Significant Developments within 5km								
1		Heathrow Expansion - Adding a Northwest Runway at Heathrow. This is located 3.55 km to the north of the Project.	Application for development consent due in 2019-2020 (Scoping Report May -2018)		Tier 2	Yes (Planned commencement of development 2021)	As per current plan, decision on this scheme is due in 2021 with the aim to start construction the same year. Due to the temporal overlap between this scheme and the Project during the construction phase, as well as the distance between them, this has been scoped in due to traffic aspects.	Yes
2		Western Rail Link to Heathrow DCO - Rail link from Reading Station to Heathrow Terminal 5 by building a new rail tunnel to link the Great Western Mainline to Heathrow Airport. Located 3 km from the Project.	2019		Tier 2	Yes (Planned start of development 2020 - 2027)	3km from Project within urban area. Unlikely to cause visual, dust or noise cumulative effects due to distance. However, scoped in for traffic.	Yes

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
3		Southern Rail Link to Heathrow - Southern rail connection between Chertsey, Virginia Water and Staines with Heathrow Terminal 5. This scheme intersects with SLP.	Operational likely between 2025-2027		Tier 3	Although timescales haven't been published as yet, in order to achieve the given operational timescales, there is a possibility that construction timescales will overlap with the Project.	There is insufficient information available at this time regarding its timescale and other details. However, in order to achieve the given operational timescales of 2025-2027, there is a possibility that construction timescales will overlap with the Project. Hence it is scoped in due to cumulative effect of all topics.	Yes
4		Windsor Rail link - Phase 1 Connects Great Western rail line from Slough and Windsor with Windsor Waterloo line and Phase 2 connects Heathrow to western and southern parts. The existing railway line of	Scoping late spring 2018/ Submission of DCO in 2020		Tier 3	Yes (construction in 2022)	Phase 1 of the proposed development is almost 10km distance, hence no likely cumulative effects envisaged. However, Phase 2 is located approximately 1.5 km and thus there is a potential to have cumulative effects. The scheme is likely to commence in 2022. Scoped in due to cumulative effects on traffic.	Yes

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		Windsor Waterloo line intersects with SLP						
5		M25 Junction 10 - Junction improvement scheme at Junction 10/A3 Wisley of the M25. This scheme is located 5 km plus from the project.	2018	7 miles	Tier 2	Yes (Planned commencement of development 2020 - 2021)	The proposed development will be constructed concurrent with project. However, it is anticipated that M25 should be able to cope with increased construction traffic from the Project in addition to the traffic generated due to the scheme. Also, the proposed development is located at a considerable distance of approximately 8 km to the south east of the Project. Hence it is considered that there will be no cumulative effects (including traffic) between these two projects and hence scoped out of the assessment. (PINS 1 and 4).	No
6		Aquind electricity cable connection at Lovedean, East Hampshire. Located 17km from the project.	Summer 2018		Tier 1	Yes (Planned commencement 2019, operational in 2022)	The Aquind connector development will be constructed approximately in similar timeline to that of the SLP Project; however due to its large distance (17 km), it is considered that there will be no cumulative effects between	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
							these two projects on any aspects and hence scoped out of the assessment.	
7		Water infrastructure projects in Hampshire: This scheme consists of a number of sewer improvements, flood protection schemes, upgrades to treatment works and projects to improve the quality of treated wastewater to meet European legislation.	Time scale: 2015 - 2019		Tier 2	Yes	Most of the schemes under this package are expected to be completed by 2019 except the Testwood Water Supply Works which is scheduled for 2025. Hence it is initially scoped in for assessment. Due to insufficient information available on the location of the individual schemes, this development has not been included in the Figure 16.1 at this stage.	Yes
Major Developments/Planning Applications within 1 km								
8		Thames Flood Alleviation Scheme Planning Application - Flood relief channel from	2018	Flood channels between 30 to 60 metres wide and	Tier 2	Yes (Planned start of development 2020 - 2021)	Scoped into assessment for all aspects due to intersection with Project both in location (specially for water aspect) and time.	Yes

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		Datchet to Teddington Lock. This scheme intersects with SLP.		14 km long				
9	08/1059	Erection of a three storey vocational building and caretaker's bungalow with associated works following demolition of existing caretaker's bungalow at Tomlinscote County Secondary School, Tomlinscote Way, Frimley, Camberley, GU16 8PY.	08/05/2015	3.69 ha	Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
10	09/0954	Erection of 5 four bedroom houses and 4 five bedroom houses	11/02/2010	0.54 ha	Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		following demolition of existing dwelling and outbuildings at Eastlea Court, 20 Westerdale Drive, Frimley, Camberley, GU16 9RB.					Project on any aspects. Hence it is scoped out of the assessment.	
11	12/0546	Hybrid planning application for major residential-led development totalling 1,200 new dwellings at Princess Royal Barracks, Brunswick Road, Deepcut, Camberley, GU16 6RN.	04/04/2014	114.32 ha	Tier 1	No	Although outside temporal scope, construction is expected to start in 2018 and hence may have a temporal overlap with the Project. This scheme also lies along the Project's construction corridor. Considering the scale and proximity of the development, there is a potential to have cumulative effects with visual, dust, noise and traffic. Hence scoped in for assessment.	Yes
12	12/0780	Erection of a detached 2 storey five-bedroom dwelling house following demolition of existing dwelling	16/01/2013	1.06 ha	Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		house at Yarrowfields, Shrubbs Hill, Chobham, Woking, GU24 8ST.					assessment.	
13	15/00140/FUL	Provision of educational facilities for Brooklands College and joint use sports facilities for Brooklands College and Thomas Knyvett College and associated development at Thomas Knyvett College, Stanwell Road, Ashford, TW15 3DU.	29/01/2016	8,450 sqm	Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
14	16/01326/FUL	Demolition of existing buildings and erection of two no. 2 storey blocks comprising 10 flats (4 no. 1	12/03/2012	0.1 ha	Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		bed and 6 no. 2 bed) together with associated parking and amenity space at 8-12 Clarendon Road, Ashford, TW15 2QE.					assessment.	
15	16/0803	Prior Notification for Change of Use of the ground, first, second and third floors from B1a (Office) to C3 (Residential) to create 31 studio units, 41 one bedroom units, 11 two bedroom units and 8 two-bedroom duplex units at The Absolute Building, Lyon Way, Frimley, Camberley, GU16 7ER.	19/10/2016		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
16	16/0836	Demolition of the Quartermaster's	08/10/2007	9.7 ha	Tier 1	No	This scheme is outside the temporal threshold, thereby	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		block and adjacent outbuildings and build a kitchen/dining hall, multifunctional space and 6No bedrooms. Remedial work to the external at Cadet Training Centre Frimley Park, Frimley Road, Frimley, Camberley, GU16 7JHD.					unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	
17	16/1207	Three detached two storey dwellings with detached double garages, entrance gates and associated accesses and landscaping at Windlemere Golf Club, Windlesham Road, West End,	23/12/2016	16.26 ha	Tier 1	No	This scheme is just outside the temporal threshold; however, the development area will be intersected by the construction corridor. Due to the size of the development, there may be a potential for overlap in the construction phases, causing cumulative effects on dust, noise and visual aspects. Hence this will be scoped in.	Yes

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		Woking, GU24 9QL.						
18	17/00358/PDO	Prior Approval for change of use from office (use class B1a) to provide 50 residential units (use class C3) comprising one bed flats at Imtech House, 33 - 35 Woodthorpe Road, Ashford, TW15 2RP.	16/01/2013	N/A	Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
19	17/0469	Erection of 4 x 2-bed terraced houses, 4 x 3-bed terraced houses, and 2 x four bed semi-detached houses with associated parking, landscaping and gardens, and creation of new access road at Heathercote Yard,	18/12/2017	0.27 ha	Tier 1	Yes	This development is located within 50 m of the construction corridor. Considering the scale and proximity of the development, there is a potential to have cumulative effects with dust, visual and noise. Hence scoped in for assessment.	Yes

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		Evergreen Road, Frimley, Camberley, GU16 8PU.						
20	17/1151	Erection of a two storey building comprising six classrooms and associated landscaping following demolition of existing single storey modular block at Gordons School, Bagshot Road, West End, Woking, GU24 9PT.	14/04/2016	7.14 ha	Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
21	RU.08/0273	Residential development for 121 dwellings (including 45 no. one bed flats, 64 no. two bed flats, 6 no. two bed houses and 6 no. three bed houses) at Former Gas	06/06/2008		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		Works Site Pretoria Road Chertsey Surrey KT16 9LN.						
22	RU.09/1093	Rationalisation including partial redevelopment and infilling of the existing healthcare campus to include up to 130,407sq. m of existing and proposed C2, D1 and ancillary floor space, 2518 parking spaces and retention of existing points of access at St. Peters Hospital Guildford Road Chertsey Surrey KT16 0PZ.	19/02/2010	13 ha	Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
23	RU.12/1277	Demolition of existing buildings and structures and development of 4 no x two	02/04/2014	2.7 ha	Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		storey dwellings each with attached / integral garage and basement together with associated landscaping and other works at Longcross Kennels Longcross Road Longcross Chertsey, Surrey KT16 0DN.					is scoped out of the assessment.	
24	RU.13/0857	Hybrid planning application for the change of use from agriculture to Publicly accessible open space (PAOS) (Sui Generis use) at Part of Trumps Farm Kitsmead Lane Longcross Chertsey Surrey.	13/12/2016	31 ha	Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
25	RU.15/0855	Outline application for the	29/01/2016	3.2 ha	Tier 1	No	This scheme is outside the temporal threshold, thereby	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		erection of up to 130 residential dwellings and all necessary ground works at Land at Hanworth Lane Chertsey Surrey.					unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	
26	RU.16/1053	Redevelopment of land to rear of existing office buildings to provide 174 residential units and associated access, car parking and landscape works (known as Phase 2) at Land to the rear of Aviator Park Station Road Addlestone Surrey.	30/06/2016	1.6 ha	Tier 1	No	The scheme is just outside the temporal threshold. However due to the size of the scheme, there is a potential that the scheme's construction phase may extend to overlap with the Project's construction phase. Hence scoped in for assessment for traffic (located 1km from the Project)	Yes
27	RU.16/1748	Proposed works comprising the following: 1) Multifaith Prayer Room 2) Offices and ancillary	18/12/2017	1.44 ha	Tier 1	Yes	Considering the scale and proximity of the development ((350m from the Project), there is a potential to have cumulative effects with visual, dust, noise and traffic. Hence scoped in for	Yes

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		accommodation for ITU and CCU 3) Modify the Outpatients Block at St Peters Hospital Guildford Road Chertsey KT16 0PZ.					assessment.	
28	RU.16/1765	Rear and roof extension to existing office building to provide 22 new residential units, with associated landscaping, car parking and other infrastructure at 120-122 Bridge Road Chertsey KT16 8LA.	18/12/2017	0.4 ha	Tier 1	Yes	The scheme is located within 500m of the project. Considering the scale and proximity of the development, there is a potential to have cumulative effects with dust, noise, visual and traffic. Hence scoped in for assessment.	Yes
29	RU.17/0766	Application for a temporary change of use of two wings of the ground floor for 2 years to a school (Class D1), use of the Abbey	13/07/2017	9,580 sqm	Tier 1	Yes	Even though the proposed development lies within the temporal threshold, however it can be scoped out considering the nature and scale of the scheme which is unlikely to create any cumulative effect with the Project on any aspect (PINS	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		Rangers Car Park for pupil drop-off and collection etc. at The Runnymede Centre Chertsey Road Addlestone Surrey KT15 2EP.					1 and 4).	
30	RU.17/1136	Proposed demolition of existing Runnymede Centre (former The Meads School) and construction of a new 6FE secondary school and associated developments on the site located at Chertsey Road Addlestone KT15 2EP.	18/07/2017	1.9 ha	Tier 1	Yes	The scheme is located within 50m of the Project construction corridor. Considering the scale and proximity of the development, there is a potential to have cumulative effects with visual, dust, noise and traffic. Hence scoped in for assessment.	Yes
31	RU.17/2014	Demolition of existing sales building and removal of existing canopy	19/12/2017	2,123 sqm	Tier 1	Yes	The scheme is located around 500 m from the Project construction corridor. Even though the proposed development lies within the	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		link. Construct new single storey sales building at Service Station Shop Addlestone Service Station Chertsey Road Addlestone KT15 2ED.					temporal threshold, however it can be scoped out considering the nature and scale of the scheme which is unlikely to create any cumulative effect with the Project on any aspect (PINS 4)	
32	RU.18/0206	EIA Screening Opinion Request for proposed development for approximately 250 dwellings at Land North of Green Lane Addlestone Surrey.	05/02/2018	9.4 ha	Tier 1	Yes	The scheme is located around 150 m from the Project construction corridor. Considering the scale and proximity of the development, there is a potential to have cumulative effects with all aspects. Hence scoped in for assessment.	Yes
33	O/16/78389	Outline Application: Residential development of up to 50no. dwellings with associated infrastructure at Crows Nest Lane, Botley,	13/05/2016 / 28/07/2017	1.63h	Tier 1	Yes	The scheme is located along the Project construction corridor Considering the scale and proximity of the development, there is a potential to have cumulative effects with visual, dust, noise and traffic. Hence scoped in for assessment.	Yes

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		Southampton, SO32 2DD.						
34	R/14/74872	Erection of sports pavilion play area and laying out of playing pitches together with associated landscaping etc. at Land to the north and east of, Boorley Green, Botley, Southampton.	04/07/2014 / 31/10/2014		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
35	R/16/79470	Reserved matters application (pursuant to outline planning permission O/12/71514 which was subject to an Environmental Impact Assessment) for the erection of 889no. dwellings and associated infrastructure at Land to the north	10/11/2016 / 13/10/2017		Tier 1	Yes	Considering the scale and proximity of the development, there is a potential to have cumulative effects with all aspects. Hence scoped in for assessment.	Yes

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		and east of Boorley Green, Winchester Road, Botley, Southampton, SO32 2UA.						
36	20209/011	Outline planning application for residential development for up to 10 dwellings and associated works at Ropley Lime Quarry, Soames Lane, Ropley, Alresford, SO24 0ER.	11/1/2017		Tier 1	Yes	Considering the scale and proximity of the development, there is a potential to have cumulative effects with visual, dust and noise. Hence scoped in for assessment.	Yes
Other Planning Applications								
37	18/0242	Renewal of planning permission reference 15/0524 for the erection of a detached 2-storey five-bedroom dwelling house at Yarrowfields;	21/03/2018	1.06Ha	Tier 1	Yes	Scoped out considering the nature and scale of the scheme which is unlikely to create any cumulative effect with the Project on any aspect (PINS 4).	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		Shrubbs Hill; Chobham; Woking; GU24 8ST.						
38	RU.18/0558	Installation of a kitchen modular building pod to replace 3no timber storage sheds at Squires Garden Centre Holloway Hill Lyne Chertsey KT16 0AE.	29/03/2018	0.6Ha	Tier 1	Yes	The proposed development lies within the temporal threshold, however it can be scoped out considering the nature and scale of the scheme which is unlikely to create any cumulative effect with the Project on any aspect (PINS 4).	No
39	Surrey Heath 09/0244	Construction of hard surface multi-use games area and associated timber structure for use as outdoor classroom/ amphitheatre at Frimley Church of England School, 124 Frimley Green Road, Frimley Green, Camberley, GU16	18/05/2009		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		6ND.						
40	Surrey Heath 09/0268	Retention of an indoor swimming pool and creation of car parking for pool users on the former tennis court at Frimley Church of England School, 124 Frimley Green Road, Frimley Green, Camberley, GU16 6ND.	01/05/2009		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
41	Surrey Heath 11/0062	Erection of a two storey dwelling and double garage following part demolition of existing dwelling and carport at 11 The Avenue, Chobham, Woking, GU24 8RU.	31/03/2011		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
42	14/00945/CPD	Certificate of Lawful	25/07/2014		Tier 1	No	This scheme is outside the temporal threshold, thereby	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		Development for a proposed detached outbuilding ancillary to the main dwelling at 85 Elizabeth Avenue, Laleham, Staines-upon-Thames, TW18 1JN.					unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	
43	16/00196/FUL	Demolition of existing commercial building and erection of a part 3-storey, part 4-storey residential development comprising 26 flats (7 no.1-bed, 17 no. 2-bed and 2 no. 3-bed) together with associated parking and amenity space at Land at Rear,	31/03/2016	1554 m^2	Tier 1	No	The scheme is just outside the temporal threshold. However due to the size of the scheme, there is a potential that the scheme's construction phase may extend to overlap with the Project's construction phase. Hence scoped in for assessment for all effects as it is in the immediate vicinity of the construction corridor of the Project.	Yes

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		Imtech House, 33 - 35 Woodthorpe Road and Part of 37 Woodthorpe Road, Ashford, TW15 2RP.						
44	17/01539/FUL	Erection of additional two floors to provide 2 no. self-contained flats at Colormax, 10A Woodthorpe Road, Ashford, TW15 2RY.	04/04/2018		Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	No
45	Surrey Heath 10/0184	Certificate of Lawfulness for proposed outbuilding to accommodate a garage, gym and storage area at 11 The Avenue, Chobham, Woking, GU24 8RU.	20/04/2010		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment	No
46		Hybrid application (full planning	2017		Tier 1	Yes	Considering the scale and proximity of the development as	Yes

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
	17/1815	application unless otherwise stated) comprising: (A) Redevelopment of west site (including demolition of all existing buildings) to provide 212 x 1, 2, 3, 4 and 5 bedroom houses and flats and 116 x 1 and 2-bedroom retirement houses at St Peters Hospital, Guildford Road, Chertsey, KT16 0PZ.					well as potential overlap in the construction phase, this has been scoped in for all effects.	
47	14/00152/FUL	Demolition of existing garages and erection of 3 no. three bedroom dwellings with associated parking and amenity space at	17/03/2014		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		Garage Site on, Land to South of Kingston Crescent, Ashford.						
48	14/01865/FUL	Demolition of existing bungalow and outbuildings and the erection of a pair of semi-detached 3 bedroom dwellings with integral garages at 21 Coleridge Road, Ashford, TW15 2QS.	18/12/2014		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
49	10/00004/FUL	Demolition of existing vacant public house and erection of 12 no. 3-bedroom houses, together with new access road and associated parking at Dog And Partridge Public House,	26/05/2010		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No

No.	Application Ref	Description and Location of Development	Date of Application	Size of the Project	Status of Application	Within Temporal Scope?	Justification for scoping in / out (including nature and size)	Progressed to Stage 2?
		Edinburgh Drive, Laleham, Staines, TW18 1PX.						
50	Spelthorne 17/00106/FUL	Erection of a two storey side extension and subdivision of plot to create 2 no. two bedroom flats with private amenity space at 87 Adelaide Road, Ashford, TW15 3LL.	05/05/2017	256sqm	Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	No
51	Spelthorne 17/00560/FUL	Redevelopment of the site to provide one building comprising 9 apartments with associated infrastructure at 55A Woodthorpe Road, Ashford, TW15 2RP.	29/08/2017	0.16Ha	Tier 1	Yes	The proposed scheme is located in the immediate vicinity of the Project. Considering the scale and proximity of the development, there is a potential to have cumulative effects with visual, dust and noise. Hence scoped in for assessment.	Yes
52	16/01883/PDO	Prior approval notification for the change of use from offices (use	19/12/2016	N/A	Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the	No

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		class B1a) to residential (use class C3) comprising 8 flats at Allington House, 3 Station Approach, Ashford.					Project on any aspects. Hence it is scoped out of the assessment.	
53	RU.16/1470	Erection of a two storey x 3-bedrooms attached dwelling to the side of the existing dwelling at 5 Canford Drive Addlestone Surrey KT15 2HH.	17/11/2016		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
54	RU.16/0247	Erection of two timber framed education buildings following the removal of 2 storage sheds at Philip Southcote School Addlestone Moor Addlestone KT15	04/06/2016		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No

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		2QH.						
55	RU.17/1110	Demolition of existing dwelling and outbuildings, and erection of replacement two storey dwelling with accommodation at Greenacres Accommodation Road Chertsey KT16 0EQ.	25/08/2017	0.73 ha	Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	No
56	RU.17/0211	Proposed erection of a replacement 2/3 storey dwelling and detached single storey outbuildings at Primrose Cottage Longcross Road Chertsey KT16 0AH.	07/11/2017	2122 sqm	Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	No
57	RU.17/0068	Demolition of existing dwelling and one outbuilding (within	29/03/2017	0.9 ha	Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is	No

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		5m of the house) and the erection of a replacement single storey dwelling at Fan Cottage Lyne Lane, Chertsey, KT16 0AJ.					unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	
58	RU.16/1814	Demolition of existing dwelling and erection of replacement two-storey dwelling at Greenacres Accommodation Road, Chertsey, KT16 0EQ. (Renewal of Planning Permission RU.13/1214)	01/06/2017	0.73 ha	Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	No
59	RU.15/0817	Erection of a detached 1.5 storey replacement dwelling with associated works at Fornham Stonehill Road	07/06/2015		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No

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		Ottershaw Chertsey, Surrey, KT16 0EW.						
60	Surrey Heath 17/1078	Two storey building comprising 2 x 1 bed flats, and 2 x 2 bed flats at 22 Grovefields Avenue, Frimley, Camberley, GU16 8PA.	21/11/2017		Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	No
61	17/0932	Erection of 2 No. light industrial/ground industrial/warehouse buildings, (Class B1C/B2/B8) and ancillary office accommodation with parking and landscaping at Plots B & C, Trade City (Former Bae Systems), Lyon Way, Frimley, Camberley, GU16	01/11/2018	1.5 ha	Tier 1	Yes	Considering the scale and proximity of the development, there is a potential to have cumulative effects with traffic. Hence scoped in for assessment.	Yes

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		7AL.						
62	Surrey Heath 16/1038	Erection of 3 external plant (air conditioning condensers) at Unit 1, Trade City Frimley, Lyon Way, Frimley, Camberley, GU16 7AL.	17/01/2017	395 sqm	Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	No
63	16/0962	Erection of 1 no. research and development/light industrial/general industry/warehouse building (Class B1b/B1c/B2/B8) with ancillary offices, car parking and landscaping and associated development at Plot A, Trade City, Former Bae Systems, Lyon Way, Frimley, Camberley.	20/12/2016	0.83 ha	Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	No

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64	Surrey Heath 16/0609	Erection of a two storey detached three-bedroom dwelling house with associated parking at Land North West of 36 To 48, Frimley High Street, Frimley, Camberley.	22/08/2016	650 sqm	Tier 1	Yes	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
65	Surrey Heath 17/0409	Erection of a three bedroom two storey dwelling house with associated parking at Thornacott 37 Brimshot Lane, Chobham, Woking, GU24 8RN.	19/07/2017		Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	No
66	Surrey Heath 17/0223	Erection of a five bedroom, two storey dwelling with attached triple garage with ancillary	14/11/2017		Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the	No

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		accommodation over, following the demolition of existing buildings at Land at Woodlands Ryde, Chobham Park Lane, Chobham, Woking, GU24 8HG.					Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	
67	RU.17/1868	CLEUD for the use of land and buildings for: a) Storage of vehicles, trailers, caravans, fairground rides and equipment; b) Maintenance, servicing, repair, refurbishment and MOT of vehicles at Woburn Park Farm Addlestone Moor, Addlestone, KT15 2QF.	17/11/2017		Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	No
68	RU.16/0175	Erection of a 50 seat spectator stand at Abbey	23/03/2016		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential	No

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		Rangers Football Club Addlestone Moor Addlestone, KT15 2QH.					cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	
69	SU/14/0800 and SU/17/0581	Subdivision of Plots 75 and 84 to convert from 2 No. four bedroom houses (with studies) into 2 No. three bedroom houses and 2 No. one bedroom flats at Former NhsBuildings, The Ridgewood Centre, Old Bisley Road, Frimley, Camberley.	15/02/2018		Tier 1	No	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	No
70	Spelthorne 17/01920/FUL	Erection of two storey rear extension to 7-9 Woodthorpe Road and two storey building with accommodation in the roof space at 7 - 9 Woodthorpe Road 5 Station	23/02/2018	N/A	Tier 1	Yes	Even though the proposed development lies within the temporal scope, considering the scale of the development, it is unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment (PINS 4).	No

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		Road, Ashford, TW15 2RL.						
71	East Leigh F/10/66472	Construction of detached four bed dwelling & detached single garage at Land rear of 21 Crows Nest Lane, Botley, Southampton, SO32 2DD.	25/01/2010 / 09/03/2010		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
72	SDNP/13/00071 /REF	Demolition of existing redundant farm buildings and construction of 2 no. Code 5 Arts & Crafts dwellings at Wolfhanger Farm, Woodlands, Bramdean, Alresford, Hampshire, SO24 0JJ.	6/11/2014		Tier 1	No	This scheme is outside the temporal threshold, thereby unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	No
73	East Hampshire 21082/003	Detached two storey dwelling	01/05/2009 / 24/06/2009		Tier 1	No	This scheme is outside the temporal threshold, thereby	No

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		following demolition of single storey dwelling and outbuildings at The Retreat, Smugglers Lane, Monkwood, Alresford, SO24 0HD.					unlikely to have potential cumulative effects with the Project on any aspects. Hence it is scoped out of the assessment.	