Southampton to London Pipeline Project

Deadline 4

Appendix 16.1 Code of Construction Practice (clean)

Application Document: 6.4

Planning Inspectorate Reference Number: EN070005

APFP Regulation No. 5(2)(a)

Revision No. 3.0

January 2020

Southampton to London Pipeline Project

Esso Petroleum Company, Limited

Code of Construction Practice

B2325300-JAC-000-ENV-APP-000055

January 2020

Southampton to London Pipeline Project

Project No:	B2325300
Document Title:	Code of Construction Practice
Document No.:	B2325300-JAC-000-ENV-APP-000055
Revision:	R2.0
Date:	November 2019
Client Name:	Esso Petroleum Company, Limited

Prepared by:
Jacobs U.K Limited

1180 Eskdale Road
Winnersh, Wokingham
Reading RG41 5TU
United Kingdom
T +44 (0)118 946 7000
F +44 (0)118 946 7001
www.jacobs.com

© Copyright 2019 Jacobs. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright.

Limitation: This document has been prepared on behalf of, and for the exclusive use of Jacobs' client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this document by any third party.

Contents

Acronyms and Abbreviations

Acronym	Definition
AMS	Archaeological Mitigation Strategy
BPM	Best Practicable Means
CCTV	Closed-Circuit Television
CEMP	Construction Environmental Management Plan
CoCP	Code of Construction Practice
CoPA	Control of Pollution Act 1974
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
ECoW	Environmental Clerk of Works
FRA	Flood Risk Assessment
GCN	Great crested newt
GWDTE	Groundwater Dependent Terrestrial Ecosystem
HDD	Horizontal directional drilling
HGV	Heavy Goods Vehicle
HRA	Habitats Regulations Assessment
LoD	Limits of Deviation
PIG	Pipeline Inspection Gauge
PRoW	Public Right of Way
PWS	Private water supply
REAC	Register of Environmental Actions and Commitments
RoFSW	Risk of Flooding from Surface Water
SAC	Special Area for Conservation
SANG	Suitable Alternative Natural Greenspace
SEP	Suitably Experienced Person
SINC	Site of Importance for Nature Conservation
SNCI	Site of Nature Conservation Importance
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SWMP	Site Waste Management Plan
TC	Trenchless crossing

1 Introduction

1.1 Overview

1.1.1 Esso Petroleum Company, Limited (Esso) is making an application for development consent to replace 90km (56 miles) of its existing 105km (65 miles) aviation fuel pipeline that runs from the Fawley Refinery near Southampton, to the Esso West London Terminal storage facility in Hounslow. The replacement is referred to as the project within this report.

1.1.2 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 Esso West London Terminal storage facility in Hounslow. The areas of land to be permanently or temporarily used for the project are known as the Order Limits.

1.1.3 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 Esso West London Terminal storage facility.

1.1.4 The project will be broken down into a number of stages. These will be based on geographical areas and could in some instances follow planning authority boundaries but would also consider the location of technically challenging sections of works such as a trenchless crossing beneath a major road or river, which may transcend planning boundaries.

1.1.5 The development authorised by the Development Consent Order (DCO) must be undertaken in accordance with this Code of Construction Practice (CoCP) pursuant to Requirement 5 of the DCO.

1.2 Structure of this CoCP

1.2.1 Section 1 in this CoCP presents an overview of the project, including outlining the purpose of this CoCP.

1.2.2 Section 2 sets out the generic construction method for different categories of construction.

1.2.3 Section 3 details the embedded design measures committed to by the project, but which are at a level of detail not shown on the DCO works plans. These are presented in Table 3.1.

1.2.4 Section 4 sets out the principal good practice measures applicable to the construction of the project.

1.2.5 This CoCP contains two annexes:

- Annex A - Areas of Reduced Working Width contains a table of locations where the working width has been reduced, committed to by the project as embedded design.
- Annex B - contains a Schedule of Trenchless Crossings which have been embedded into the design.

1.2.6 Throughout this document, each good practice measure has been assigned a reference number, for example (G7). This is for ease of cross-reference to other documents and chapters such as the REAC (see Chapter 16 Environmental Management and Mitigation within the ES). In addition, good practice measures are included in documents secured under individual requirements of the DCO, such as the Outline Construction Environmental Management Plan (CEMP) and the Outline Landscape and Ecological Management Plan (LEMP).

1.3 Purpose of the Code of Construction Practice

1.3.1 The CoCP implements good practice measures outlined in the Environmental Statement and Planning Statement. Compliance with the CoCP is required under Requirement 5 of the DCO.

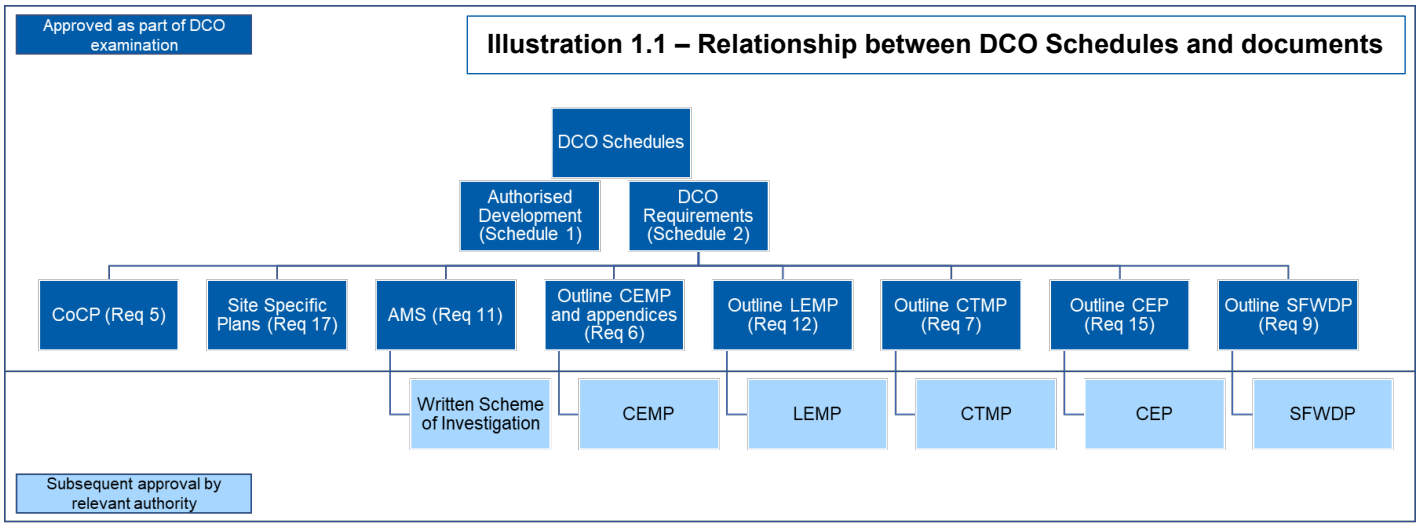
1.3.2 The CoCP provides a consistent approach to the control of construction activities along the entire pipeline, and mitigates potential impacts on people and the environment. This includes standard construction methodologies that will be adopted as part of the implementation of the proposed pipeline.

1.3.3 The CoCP should be read alongside the CEMP, Construction Traffic Management Plan (CTMP) and the LEMP. Outline versions of these documents will be certified as part of the DCO, and the final documents would be subject to approval by the relevant planning authorities.

1.3.4 Site Specific Plans (SSPs) providing location-specific construction methodologies have also been prepared as documents certified as part of the DCO, and construction within those sites must be in accordance with those plans.

1.3.5 The project would be run in compliance with all relevant legislation, consents and permits. Any statutory requirements listed in this document and industry good practice guidance which has informed each part of the document are not to be seen as exhaustive.

1.3.6 Esso will put in place robust procedures to inform and supervise all those working on the project including its supply chain of contractors to make sure the control measures set out in the CoCP are adopted when undertaking the construction of the pipeline and ancillary works. The main responsibility for implementing these control measures will fall to Esso's principal contractor.



1.4 Project Description

1.4.1 The project comprises the following elements:

- 97km of new pipeline to be routed via the Alton Pumping Station to deliver greater connectivity and resilience to the UK fuel supply network;
- a new "pigging" station at Boorley Green to allow the entry and exit points for Pipline Inspection Gauges during inspections;
- 14 remotely operated in-line valves along the pipeline to allow isolation for maintenance or to limit the impact of a potential leak;
- a pressure transducer to monitor the pressure within the pipeline;
- six new above ground cathodic protection (CP) transformer rectifier cabinets to supply power to the existing CP system;
- pipeline markers along the route at all road crossings and boundaries and new red and black colour-coded flight marker posts;
- modifications to the PIG station at the West London Terminal storage facility including installation of a new PIG receiver; and
- replacement pumps at the Alton Pumping Station.

1.4.2 The replacement pipeline would tie in to the Alton Pumping Station, as this would deliver greater connectivity and resilience to the UK fuel supply network.

1.4.3 The replacement pipeline would be buried underground. The minimum depth from the top of the pipe to the ground surface would be 1.2m in Open Cut sections, and deeper for trenchless crossings. The pipeline would be installed using Open Cut trenching methods for most of the route.

1.4.4 For major crossings of A-roads, motorways and some other heavily trafficked roads, railways and some watercourses, specialist trenchless techniques would be used. Crossings of watercourses including rivers, streams and ditches would typically be Open Cut. Annex B contains the schedule of trenchless crossings in more detail.

1.4.5 Where practicable, the scheme has been designed to avoid sensitive features, referred to in the Environmental Statement as embedded design measures. Where these measures are incorporated directly into the design (i.e. the Order Limits avoid a sensitive feature), the details are not included here.

1.4.6 The Order Limits encompass the land required permanently and temporarily to build and operate the pipeline. This includes the working width to install the pipeline, construction compounds, logistics hubs, laydown areas, road access points, land required for above ground features (such as the new pigging station, valves and CP transformer rectifier cabinets), and an easement strip that extends 3m either side of the final pipeline location.

1.4.7 The Limits of Deviation (LoD) are located within the Order Limits. These show the widest area, within the Order Limits, within which the pipeline may be installed. The pipe would be installed to reduce impacts to sensitive features, and the working width restricted as far as is practicable. In places, the LoD has been reduced in width

to allow for the protection of sensitive environmental features. This is expressed in the Works Plans forming part of the DCO.

1.4.8 In certain areas a commitment has been made to a narrower working width within the Order Limits to reduce impacts at these specific locations. This is because flexibility is still required within the Order Limits to determine where the narrow working width would be located, to account for unexpected ground conditions and other factors that determine the final location of the pipeline. These locations are included in Annex A and noted on the General Arrangement Plans.

1.4.9 The existing pipeline would continue to be operated to maintain fuel supply during the installation of the pipeline. This is because the existing pipeline cannot be taken out of operation for more than short periods, to ensure secure supplies to customers. Once the replacement pipeline is fully operational, the existing pipeline would be decommissioned.

2 Construction Method

2.1 Construction Schedule

2.1.1 Works to install and commission the pipeline are expected to start from grant of Development Consent Order (DCO) and be completed by early 2023. Certain advance works (such as archaeological trial trenching or site preparation for the logistics compounds) may take place outside of the development consent order where consented under alternative regimes, for example, the Town and Country Planning Act 1990.

2.1.2 The construction schedule will continue to be developed as the project progresses and will need to take account of seasonal constraints such as animal breeding or hibernation seasons, working in schools and sports facilities, and reducing impacts associated with flood zones.

2.1.3 The project will be managed in sections, or stages based on area/location. The authorised development may not commence until a written scheme setting out all stages of the authorised development relevant to it has been submitted to the relevant planning authorities (DCO Requirement 3).

2.1.4 Throughout the installation of the pipeline there would be a number of work fronts. A work front is a specific area or location where a crew generally comprising up to 10 construction workers are carrying out a particular aspect of the main pipeline construction activities, including topsoil stripping, trench excavation, pipe installation, backfilling of trenches and reinstatement. There may be several work fronts operating simultaneously.

2.1.5 It is anticipated that construction of the pipeline will take approximately two years with the rate of progression in each specific area dependent on the setting and proximity of sensitive features. In rural, agricultural areas it is anticipated that pipe-laying would take place at a rate of approximately 450m per week, whereas for streetworks the rate is likely to be around 90m / week. However, specific techniques such as narrow working, protection of tree roots, or trenchless operations will take longer than the standard working rates assumed.

2.1.6 The construction schedule would also take account of specific limitations such as ecological seasonal constraints on timing and/or duration. Specific commitments have been made as noted below to ensure construction works are carried out in line with the assumptions of with the Habitats Regulations Assessment.

2.2 Construction Schedule in Suitable Alternative Natural Greenspace (SANGs)

2.2.1 Construction works in the SANGs will be limited to a maximum of two years in duration. This will run from the commencement of any fencing activity or other works that deny access to any part of the SANG to members of the public. Esso will provide advance written notice to the relevant planning authority of the commencement date.

2.2.2 All construction activities within the SANG will be fully demobilised within the two-year period and reinstatement completed with all protective fencing removed. When

planning reinstatement of the SANG, Esso will consult with the relevant planning authority over the timetable for reinstatement taking account of ecological good practice and recognising that it may be appropriate to defer replanting and reseeding/turfing to take advantage of optimum growing seasons and conditions. In such circumstances, and only with the agreement of the relevant planning authority, it may be appropriate to extend reinstatement and maintain protective fencing beyond the two-year deadline.

2.2.3 Where operating under such an extension, Esso would make sure that all affected paths and circular walks are restored to their original condition and available for public use and any protective fencing required would be the minimum necessary taking account of the nature of the replanting.

2.3 Construction Phase Activities

2.3.1 Prior to installation, several activities would be undertaken. Such activities would include but not be limited to:

- communication with all consultees and the publicising of contact methods;
- early environmental mitigation works;
- route survey, setting out and record of condition;
- utility diversions;
- working area preparation;
- temporary fencing;
- pre-construction drainage;
- provide temporary access tracks for construction; and
- establishment of logistics hubs.

2.3.2 In general terms, the following tasks would be undertaken during the installation phase:

- establish construction compounds;
- public highways and Public Rights of Way closures and diversions;
- topsoil removal and storage;
- haul road construction;
- pipe storage and stringing;
- welding and joint coating;
- trench excavation and pipe installation;
- installation of trenchless crossings; and
- reinstatement.

2.4 Mobilisation and Site Setup

2.4.1 Vegetation Retention and Removal Plans will be notified to the relevant planning authorities in accordance with Requirement 8(1)(a) of the DCO. These plans will be

based on the final design alignment which will take into account the construction and environmental good practice measures, local features, and engineering constraints. These plans will reflect the requirements of section 4 of the LEMP. Where an SSP is applicable, vegetation removal and retention must be in accordance with the vegetation retention and removal plans set out in the relevant SSP, save with such variations as may be agreed by the relevant planning authorities.

2.4.2 A full record of condition will be carried out (photographic and descriptive) of the site and surrounding areas that may be affected by the construction activities. This record will be available for comparison following reinstatement after the works have been completed to ensure that the standard of reinstatement at least meets that recorded in the pre-condition survey.

2.4.3 All necessary early environmental and ecological mitigation works will be carried out in accordance with the commitments laid out in this CoCP, the CEMP, the Vegetation Retention and Removal Plan, the LEMP, and Site Specific Plans.

2.4.4 During the set-up of the logistics hubs and construction compounds the following site layout and housekeeping measures will be implemented (and briefed to all staff during their induction (G7)). These may include:

- pest and vermin control, and treating any infestation promptly. This would include arrangements for the proper storage and disposal of waste produced on site;
- inspecting and collecting any waste or litter found on site;
- locating or designing site offices and welfare facilities to limit the overlooking of residential properties;
- locating and designated smoking/vaping areas to avoid significant nuisance to neighbours;
- managing staff/vehicles entering or leaving site, especially at the beginning and end of the working day;
- avoiding the use of loudspeaker systems or radios; and
- managing potential off-site contractor and visitor parking.

2.4.5 Stored flammable liquids such as diesel would be protected either by double-walled tanks or stored in a bunded area with a capacity of 110% of the maximum stored volume. Spill kits would be located nearby. (G195)

2.4.6 Traffic Management measures will be applied to all construction traffic in accordance with the CTMP or any applicable highway authority permits. Traffic Management measures will be designed to reduce risks to members of the public including road users and the workforce. Typical measures applied include road signage, traffic cones, barriers, traffic lights, ‘go, no-go’ systems and lane closures, and each traffic management plan will specify which measures will apply to each site location.

2.4.7 An appropriate speed limit would be imposed on vehicles travelling on site (G14).

2.4.8 Vegetation will be removed in accordance with the Vegetation Removal and Retention Plans. If protected species licences are required they will be applied for and approved by Natural England before construction activities commence (G43).

2.4.9 Wheel washing tanks/facilities would be provided at both logistics hubs and compound access points on to the highway. An adequate supply of water would be made available at these locations at all times (G15). Water-assisted road cleaners would be deployed on public roads where necessary, to prevent excessive dust or mud deposits (G20). Vehicle loads would be sheeted during the transportation of loose, potentially dusty or contaminated excavation material (G21).

2.4.10 A range of delivery vehicles will be used e.g. light goods vehicles and vans to deliver smaller items, through to Heavy Goods Vehicles (HGV) and low-loader units to deliver larger items such as excavators, construction mats, bending machines, and Portakabin™-size local welfare units. Construction traffic movements would be kept to the minimum reasonable for the effective and safe construction of the project (G26).

2.4.11 Access and egress points from public highways will be designed to reduce risks and the safe passage of construction traffic. Measures such as 'bellmouth' construction and temporary construction matting or temporary hardstanding construction will be used to protect verges and provide a sound foundation for the safe passage of vehicles. Once a safe off-highway area adjacent to the highway has been made, a loading/offloading area will immediately be constructed to enable plant and equipment to be offloaded safely away from public roads.

2.4.12 Equipment will be delivered and offloaded at site using either forklift trucks, HIAB type trucks or portable cranes. All lifting appliances and equipment will be certified. Lifting will only be carried out by certified and competent personnel. Lifting will be closely controlled to ensure that members of the public and the workforce are not put at risk from any lifting operation and will be carried out in strict compliance with a specific lift plan. The lift plan will take into account the type and weight of the load, positioning of the lifting equipment (e.g. proximity to members of the public and the workforce, buried and overhead services/utilities) and weather conditions.

2.4.13 Security fencing will be installed around the roadside access areas along with signage restricting access to construction traffic and construction teams only. All plant and vehicles would be required to switch off their engines when not in use and when it is safe to do so (G23).

2.5 Open Cut

Preparing the working width including haul road

2.5.1 Once the access points from public highways to the works have been made construction areas and temporary works areas, fencing can proceed.

2.5.2 Temporary working width fencing will be installed in accordance with the design. The type of fencing to be installed is dependent on the area to be fenced and factors considered would be the required security level in relation to the surrounding land and public access, rural or urban environment and arable or stock farming (G85). Fencing types vary ranging from post and rope demarcation fencing in open low risk arable areas to 'Heras' type security fencing in areas that require high security to

prevent access to the works. Stock-proof temporary fencing includes post and 'stock' wire, and post and rail fencing with or without barbed wire, dependent on the livestock and specific landowner requirements. Fencing would be regularly inspected and maintained and removed as part of the demobilisation unless otherwise specified.

2.5.3 Pedestrian access to and from residential, commercial, community and agricultural land uses would be maintained throughout the construction period. Vehicle access would be maintained where practicable. This may require signed diversions. The means of access would be communicated to affected parties at least two weeks in advance (G79).

2.5.4 Where field to field access points would require alteration as a result of construction, alternative field access would be provided in consultation with the landowner/occupier. Recessed field access from local roads would be reinstated where agreed with the landowner (G80).

2.5.5 Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate protective buffer would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage (G40). The buffers will be shown on the Retention and Reinstatement Plans contains within the LEMP. In some locations, there may be the need to prepare a method outlining how a specific sensitive feature would be retained. These methodologies would be included within the LEMP.

2.5.6 For those locations which have been identified in the Noise and Vibration Management Plan forming part of the CEMP as potentially affected by noise generated on site, fence-mounted Echo Barrier™ (or similar) acoustic barriers would be installed to reduce the noise disturbance (G107).

2.5.7 As the working area crew proceed, overhead cable protection measures would be installed. These would comprise a combination of restricted access under overhead cables, fencing, signage and bunting/warning tape each side of the overhead cable along the right of way.

2.5.8 Additionally, temporary protection measures and identification of buried services will be applied. All buried services will be clearly marked using measures that may include temporary spray paint, signage, wooden pegs and high visibility fencing for exclusion zones. Buried services area exclusion measures will be applied as required by the design, and asset owner requirements for services such as gas and oil pipelines, buried cables etc. The area exclusion and temporary protection measures may include temporary high visibility fencing, temporary construction matting and signage.

2.5.9 Where footpath/bridleway access across the working width is required, the fencing and access arrangements will be constructed in accordance with DCO requirements (such as the CTMP) and any applicable highway authority permits to provide safe passage of people and animals. At intersections between the working area and path/tracks, pedestrian crossing points will be installed. Pedestrians will have priority at these crossing points – the gates are only 'closed' when works require. At such times operatives will be stationed at the crossing point to facilitate public access.

2.5.10 Where watercourses are encountered that require the passage of construction traffic, measures to be applied include the use of 'flume' pipes or temporary spanned bridges. Flume pipes are temporary pipes placed in the watercourse to permit the flow of water through the pipe. Once the flume pipe is installed, the area above the flume pipe is backfilled and construction mats are placed over the backfilled area to permit the passage of plant, equipment, pipeline materials and people. Flume pipes will be sized to reflect the span width and the estimated flow characteristics of the watercourse under peak flow conditions. Section 2.9 below contains further information on water crossing.

2.5.11 Temporary spanned bridges (Bailey bridges) involve the construction of a raised soil platform each side of the watercourse (set back from the watercourse banks) and a temporary bridge is lifted onto the spoil platform. Temporary bridges will be designed specifically to consider the span length and the weight and size of plant and equipment that will cross the bridge.

2.5.12 Consultation with affected landowners will be carried out to investigate the current extent of land drainage. A scheme of pre-construction land drainage will be designed with the intent of maintaining the efficiency of the existing land drainage system and to assist in maintaining the integrity of the right of way during construction. The scheme may include a system of 'cut-off' drains which feed in to a new header drain and the scheme will also take into account surface water runoff mitigation measures. (G82)

2.5.13 As the right of way construction progresses, surface water runoff mitigation measures may be installed. These may include measures such as water stops, silt netting, temporary lagoons, cut-off drains, cut-off channels and silt busters (filtration tanks). The extent and detail of surface runoff mitigation measures will be specified in the right of way design. (G198)

2.5.14 Topsoil will be stripped, in accordance with the Outline Soil Management Plan, using a combination of excavators and bulldozers. These will be delivered on low-loaders to the construction compound, before being transferred onto the working spread. Topsoil will be pushed to the edge of the working area and heaped such that the spoil heap does not encroach outside the fenced area.

2.5.15 Where appropriate, topsoil stripping will be monitored by an archaeologist in order that any archaeological features uncovered during topsoil removal can be investigated in accordance with the Archaeological Written Scheme of Investigation.

2.5.16 A series of archaeological trial-trenching is being undertaken in advance of the main works to assist in identifying the extent of archaeology. This may result in archaeological mitigation in accordance with Requirement 11 of the DCO which would comprise either a full or sample excavation; strip, mapping and sample prior to construction, or an archaeological watching brief during construction (G68).

2.5.17 Above ground installations such as the valve chambers will be set out and fenced progressively as the works continue.

Pipe String and Cold Bending

2.5.18 Following working area construction and topsoil stripping, the transport of pipe and bends to the working area, the stringing (laying out the pipe and bends in readiness for welding) and bending operations will be carried out as follows.

2.5.19 Pipes and bends will be loaded onto flatbed HGV trailers using specialist certified lifting equipment. Pipe loads will be secured using dunnage, bolsters, stanchions and heavy-duty cargo straps; and pipe bends will be secured using dunnage, bolsters and heavy-duty cargo straps to ensure that they secure during transportation to site.

2.5.20 If it is not possible to transport the pipe and bends to the off-road site location using road-going vehicles, they will be transferred to a trailer suitable for off-road travel. No offloading/transfer will be carried out on public roads. All materials offloading/transfer from road vehicles/trailers will be carried out in the dedicated construction compounds. All lifting will be carried out in accordance with a dedicated lift plan by a suitably qualified and experienced lift team.

2.5.21 On arrival at the working site for installation, pipes and bends will be offloaded in a line in readiness for welding, onto wooden pipe supports, and secured with wedges.

2.5.22 A cold bending machine will be used and will travel progressively along the working area carrying out cold bending where required. Individual pipe joints are fed into the bending machine in incremental stages. The pipe sits in a cradle and between each incremental feed hydraulic rams carefully bend the pipe to the desired angle per increment. The cold bending continues until the desired bend angle for that individual pipe joint is achieved. The pipe joint is then lifted out of the bending machine and inspection is carried out to the pipe surface and coating, and the pipe is replaced back onto wooden pipe supports in its correct position within the stringing line in readiness for welding.

Pipeline Fabrication

2.5.23 Welding, grinding and pipe coating will be carried out to a detailed procedure that meets the standards required by international, national and project-specific specifications. The area will be screened to prevent impact from the works to members of the public and the workforce.

2.5.24 Welding the first pipe in the string will be set onto and secured on timber pipe supports and an internal pipe alignment clamp will be inserted into the pipe. The second pipe will be lifted from its pipe supports and fed over the internal pipe clamp that protrudes from the open end of the first pipe. Welding is then commenced until the first weld pass is completed after which the two pipes are lowered onto timber supports. The clamp is moved forward using in-built hydraulic rollers until it protrudes from the open end of the second pipe and the third pipe is lifted into the internal clamp and welded in the same manner as the first weld; and the process is repeated to form a continuous pipe string.

2.5.25 While second and third pipes are being set up and initially welded, the remaining passes of the first weld will be completed. This process will be repeated to form a continuous pipe string. The open ends of pipe strings are sealed with plastic end caps to prevent the ingress of dirt and foreign objects.

2.5.26 When induction bends are encountered (bends made in a factory under controlled conditions with a shorter radius than site-made cold bends) the internal clamp is not used; in this case an external mechanical cage clamp will be used.

2.5.27 Gaps between pipe strings are left at pre-determined locations for example railways, roads, accesses and rivers, and individual fabrications are made to fill the gaps at a later date as excavation and "lower and lay" progresses or via different installation techniques such as Horizontal Directional Drilling (HDD) or auger boring. These individual fabrications may be made by further smaller welding crews ahead of or behind the pipeline welding crew.

2.5.28 When the welds have cooled to ambient temperature, non-destructive testing will be carried out. An Automatic Ultrasonic Test (AUT) will be carried out to each weld. The effectiveness and sensitivity of the Automatic Testing Procedure (ATP) will have been proven to ensure that it meets detailed international, national and project-specific standards.

2.5.29 If a weld defect is detected that falls outside the tolerances permitted within the international, national and project-specific standards, a weld repair will be carried out. This involves grinding of the weld in the defective area to remove the defect, and re-welding. Further non-destructive testing will be carried out (Automated Ultrasonic Testing or radiography) to the area of weld repair to confirm that the quality requirements of the international, national and project-specific standards have now been satisfied. Note that the conduct of radiographic testing will be carried out in strict compliance with the Ionising Radiation Regulations 2017 and measures such as local shielding and exclusion zones will be in place to ensure that the workforce and members of the public are protected.

2.5.30 Once weld quality requirements have been satisfied the welds will be covered with an anti-corrosion coating. Initially the weld area will be blast-cleaned by propelling grit onto the metal surface using compressed air. Screening will be applied where there is a possibility of stray grit affecting the workforce or members of the public and exclusion zones will be enforced during this activity.

2.5.31 The surface cleanliness and profile (degree of abrasion) will be examined and when acceptable the liquid epoxy coating will be applied. The coating will be applied using either a spray or hand brushes to build up to the minimum required coating thickness.

2.5.32 Once cured (when the coating has set) the coating is visually examined, thickness is checked and the coating is electrically tested to confirm that it meets the required standards; and periodic destructive adhesion tests are also carried out.

2.5.33 When the pipe strings and fabrication welds have been welded, non-destructively tested and coated successfully, they are ready for the lower-and-lay activities.

Trench Excavation and Pipeline Installation (Lower and Lay)

2.5.34 This section covers how works would be carried out in the typical 30m working width.

2.5.35 A GPS survey will be carried out along the trench centreline and the location will be clearly marked with wooden pegs indicating the required trench location and required depth.

2.5.36 The trench will be progressively dug using excavators and the excavated soil will be placed adjacent to the trench as per the requirements of the Soil Management Plan forming part of the CEMP. Excavated soil will generally be stored on the opposite side of the working area from topsoil and there shall be no mixing of topsoil and subsoil (G155). Temporary works and any edge protection will be installed. Dependent on the structure of the subsoil it may be necessary to excavate some areas in distinct layers and backfill the material in the same structured layers once the pipe is installed.

2.5.37 As the trench excavation progresses the condition of the excavated trench bottom is assessed. If the trench bottom is not suitable to receive the pipe (e.g. presence of stones or flint that may damage the pipe coating) bedding to the trench bottom will be required. Bedding will consist of either filtered subsoil taken from the adjacent area or imported bedding material such as sand which will be delivered to site using HGV tipper wagons. If the HGV tipper wagons are not able to access the direct site location along the right of way, stockpiles will be made adjacent to the site access points. Bedding materials will not be stored in areas accessible to the public. Bedding materials will be transported from the stockpile area using dumper wagons and dumper trucks specifically designed for off-road use.

2.5.38 Periodically to match the breaks in pipe strings, 'bell-holes' – larger excavated holes around the laid pipe used for man access into the trench – will be excavated at locations where below-ground welds are required. Because the workforce need to enter bell-holes they are designed to make entry and working within the bell-hole safe. Temporary works systems at bell-holes include 'battering' (creating a slope) of the excavation sides, stepping the excavation sides, trench boxes, and sheet piles with supporting frames. These may be at locations such as buried services, ditches, roads and areas where trenchless crossings have been carried out where it is not possible to lay the pipe strings in a single continuous length.

2.5.39 Once the trench is in an acceptable condition to receive the pipe, lower and lay operations can commence. Pipe strings and fabrications are lifted from their supports and the integrity of the coating of the entire pipe string/fabrication is tested (electrical coating test) to ensure the soundness of the coating system. Lifting is carried out using certified equipment, either excavators or side booms in accordance with pre-agreed plan by a certified and competent lifting crew. The tail of the first pipe is lowered into the trench using the natural curvature of the pipe. Once the first pipe section is on the trench floor the lifting equipment is moved along the pipe string individually so that the pipe string is secured and supported by the lifting device each side. During the process the pipe string is manoeuvred from the supports above ground into the trench. Known as 'hopping', this technique is applied progressively until the last lifting device reaches the last pipe section and it is lowered into the trench.

2.5.40 Pipe strings and fabrications are progressively lowered into the trench in this way and they may be 'overlapped' at bell-hole locations where pipes are later cut to match lengths and welded connections are made in the bell-hole. The same welding, non-destructive testing and coating process is applied as that used above ground.

2.5.41 Occasionally it may be necessary to remove water from the trench and excavations and this is carried out using portable pumps. Temporary stanks would be installed

within the trench prior to undertaking dewatering/draining activities, to prevent migration of water within the trench (G134). Water is tested then discharged strictly in accordance with the Water Management Plan Appendix of the CEMP and will be filtered using a variety of techniques that may include silt netting, straw bale filtration barriers, temporary settlement lagoons, silt socks over pump discharge hoses and silt busters (purpose designed filtration tanks) (G143).

Backfilling of trench

2.5.42 Backfilling commences progressively to keep up with lower and lay activities so that excavations are kept open no longer than necessary. The same criteria applied to trench bedding material, apply to the first layer of material that will surround the pipe, i.e. no materials that may cause damage to the pipe coating for example, stones or flint. If 'intimate surround' material (first layer of backfill) is required, it will either consist of filtered subsoil taken from the adjacent area or imported padding material and the process of getting the imported intimate surround material to the specific site location will be the same as that for bedding material.

2.5.43 Backfill will progress in layers with each layer compacted sufficiently to prevent subsidence in the future. Part way through the backfill process heavy duty warning tape will be laid as a protection measure against the possibility of damage to the pipeline from future excavation activities.

2.5.44 During the backfill process impact protection measures such as protection slabs or protection mesh may be installed where detailed in the design.

2.5.45 As backfill is completed, post construction drainage is applied in accordance with site-specific design. The design will take into account the drainage system uncovered during topsoil strip and trench excavation in addition to the original design prepared for pre-construction drainage which considered the existing scheme and landowner requirements.

2.6 Trenchless: Auger Bore

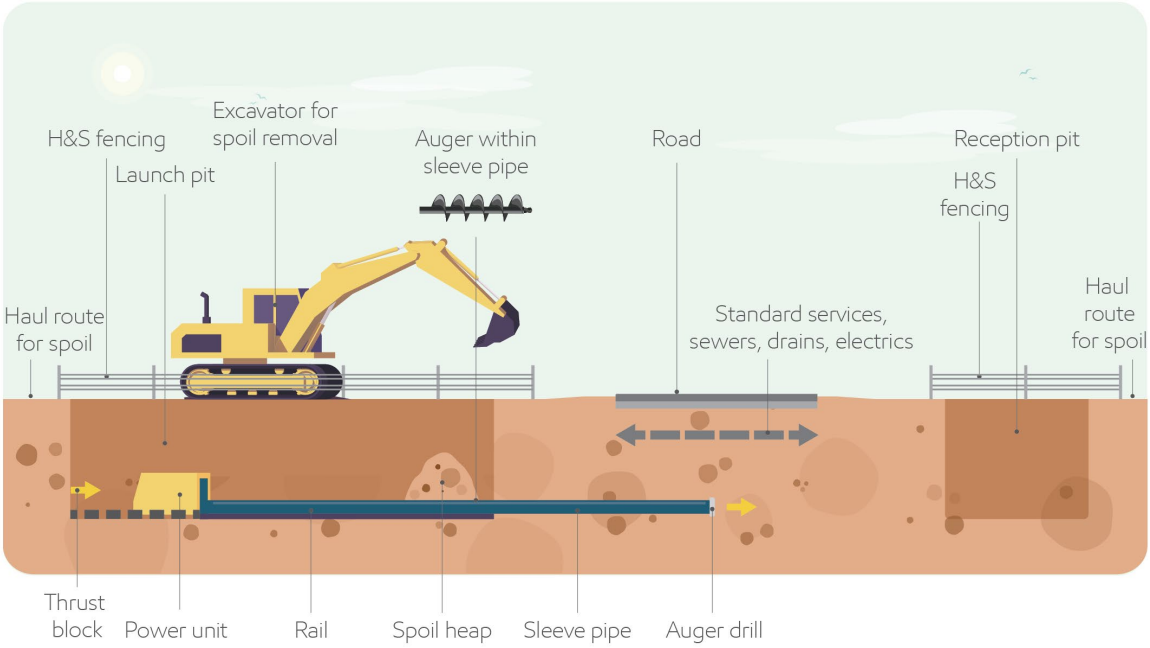


Illustration 2.1 – Example of an Auger Bore Technique

2.6.1 Annex B contains a list of the trenchless crossings that the project has committed to providing along the route. Unless stated otherwise below, site set-up and reinstatement will be as per section 2.4 and section 2.17.

2.6.2 Excavations will be made to a pre-determined depth and size as indicated in the crossing specific design. During construction of the excavations, supports (temporary works) will be installed to protect the workforce from side wall collapse and to provide a safe working environment.

2.6.3 A solid base foundation will be installed in the bottom of the excavation at the correct alignment and depth in readiness for the auger bore machine support rails. The auger bore support rails will be lifted into position ensuring accurate alignment by GPS survey to the bore path as this dictates the accuracy of the auger bore drill alignment.

2.6.4 An auger bore shield will be installed at the end of the first pipe. This provides a shroud for the cutting head and protects the pipe end as the pipe progresses through the auger bore.

2.6.5 The first auger screw with the cutting head attached will be inserted into the lead pipe and the assembly will be lowered into the drive pit using either a hydraulic excavator or mobile crane in accordance with a specific lift plan.

2.6.6 The lead pipe assembly will be held in alignment at the auger bore entry point and the auger bore machine will be propelled forward using the auger bore hydraulic rams. The connection will then be made to the drive coupling at the rear of the first auger screw which sits inside the lead pipe to the drive spigot on the auger bore machine. The auger bore machine is now engaged.

2.6.7 Drilling is carried out in a controlled manner through rotating the auger screws that sit inside the carrier pipe while moving the auger machine forward using the auger machine jacks set into the base rails until the first pipe is installed. Spoil is removed as it is discharged from the rear of the first pipe during the boring process.

2.6.8 While the lead pipe is being drilled/inserted into the bore another auger screw is loaded into the second pipe. Once the lead pipe has been successfully installed into the bore, the auger bore machine is withdrawn and disengaged from the lead pipe screw. The second pipe is lowered into the drive pit and the auger screw that sits at the front of the second pipe is coupled to the auger screw that sits inside the rear of the lead pipe.

2.6.9 A weld is made between the lead pipe and second pipe. The welding will be carried out to a procedure that meets the standards required by international, national and project-specific specifications. The welding will be carried out within the excavation therefore there is no exposure of the welding arc to members of the public. The weld will be examined by non-destructive testing (Automated Ultrasonic Testing) to ensure it meets the minimum quality requirements required by international, national and project-specific specifications. The weld will then be coated using a high strength liquid epoxy coating that cures to form a strong corrosion-resistant barrier and the soundness of the weld coating is tested.

2.6.10 The auger bore machine is then engaged to the drive coupling at the rear of the second auger screw which sits inside the second pipe and auger boring then re-commences as detailed above for the lead pipe.

2.6.11 This process is repeated using sufficient lengths of pipes to achieve the desired length of crossing. During the installation process line and level of installed pipes are surveyed for alignment in the drive pit by GPS survey technology to ensure that the pipe is being installed on the correct drill path. The auger bore crossing is considered successful when the lead pipe protrudes through the reception excavation face at the correct location.

2.6.12 In challenging ground conditions where there is a risk of damage to the pipe coating, sacrificial pipe may be used to carry out the drilling installation. Once the auger bore crossing is completed, the product pipe is welded to the rear of the last sacrificial pipe and pushed through in sections using the auger bore jacking system. As the new pipe sections are inserted at the drive pit side of the crossing, the sacrificial pipe sections are removed at the reception pit side of the crossing. This reduces the risk of damage to coating on the permanent pipe.

Auger Tie-Ins, Demobilisation and Reinstatement

2.6.13 The auger screws will be removed in sections from the installed pipe bore by withdrawing them using the auger bore machine rams. The auger machine will then be disassembled from the rear of the last screw. The auger bore machine and rails will be removed from the drive pit excavation using either an excavator or mobile crane in accordance with the specific lift plan.

2.6.14 The open trench installation of the pipe may not take place at the same time as the auger bore section and therefore the bell-hole will be appropriately fenced and secured until both sections are ready to be welded together.

2.6.15 Once the pipeline at each end of the auger bore is installed, the sections are ‘tied-in’ (welded together) to the auger bore pipes and the welds are again tested using non-destructive testing and are coated with the liquid epoxy field joint coating.

2.6.16 As the excavation supports are removed, the excavations are backfilled and compacted using track or wheel-mounted excavators and compaction equipment to a standard that ensures no future subsidence will occur.

2.6.17 Any waste generated by the auger bore process will either be recycled or removed to a licensed facility in accordance with the Site Waste Management Plan forming part of the CEMP.

2.7 Trenchless: Horizontal Directional Drilling HDD

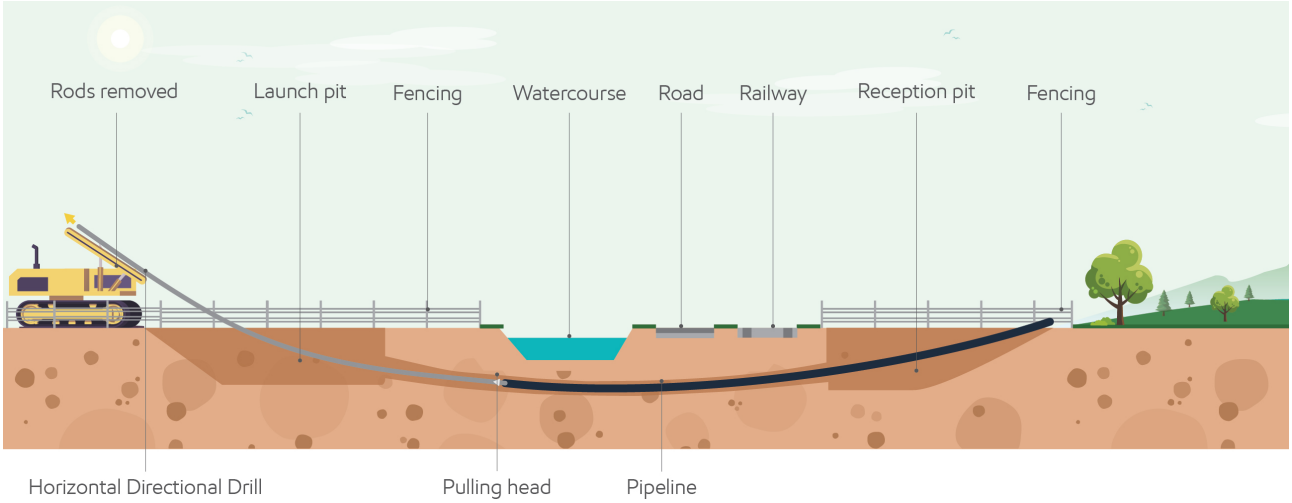


Illustration 2.2 – Example of an HDD Technique

2.7.1 Annex B contains a list of the trenchless crossings that the project has committed to providing along the route. Unless stated otherwise below, site set-up and reinstatement will be as per section 2.4 and section 2.17.

2.7.2 In accordance with commitment G118, the detailed design for HDD would include depth and profile and consider methods to reduce the risk of groundwater breakout during HDD.

2.7.3 The footprint required for the HDD works is greater than that required for an auger bore due to the ancillary equipment (including control cabins) required for this technique.

2.7.4 An excavation (to a size detailed in the site-specific design, normally approximately 2m deep and 3m square) is made by mechanical excavator at both the drill entry point and the drill exit point to contain drill fluid at each end of the drill path.

2.7.5 The pilot hole will be drilled along the trajectory indicated on the crossing specific design which shows the angle of entry and exit, radius of the curvature, and depth. The pilot hole will be drilled using screw-jointed drill pipes connected as the drilling proceeds, gradually forming the drill string. Drilling will progress utilising the hydraulic cutting action provided by a combination of the tool bits and jetting an inert bentonite solution (known as drill mud) through the jet tube and nozzle assembly. The drill head steering is controlled via a 'Digi-track' system or similar by rotation of the pilot drill head and 'live' tracking is maintained and controlled from within the drill control unit sited at the drill entry point.

2.7.6 Following the successful completion of the pilot drill it may be necessary to enlarge the drill bore by carrying out a reaming operation (this creates a slightly larger-diameter hole ahead of the front of the drill). Pre-reaming tools are installed on the end of the drill string at the exit point and the drill string is then withdrawn through the bore made by the pilot hole to enlarge the bore by the reaming tool in readiness for pipe pullback.

2.7.7 Throughout the drilling process, parameters such as drill torque and drill fluid pressures are monitored and compared against predicted values to ensure that the

drill is progressing as expected and to make adjustments as required. Also throughout the drilling process, monitoring is carried out at pre-determined locations to check that there is no surface disruption such as settlement or heaving caused by the drilling process. Contingency plans will be in place to deal with any indications of subsidence encountered. Drill fluid levels are monitored and the drill path is patrolled to ensure that there are no inadvertent returns of drill fluid to the surrounding landscape. Contingency plans will be in place to deal with any indications of drill fluid release.

HDD Pipe String Fabrication and Pipe Pullback

2.7.8 Individual pipe lengths will be welded together to form one string (to the full length required), using the method detailed for open trench excavation. Once all steps have been taken in readiness for pipe pullback, the pipe string coating is given a final non-destructive test to ensure that there are no defects present. The front of the pipe string is lifted to a pre-determined height to provide the correct curvature that matches the angle of drill exit point to provide for a smooth entry for the pipe string into the HDD bore.

2.7.9 Utilising the HDD rig at the other end of the HDD profile (at the drill entry point) the pipe string is pulled through the drill bore using the connected drill rods in a controlled manner, and pulling pressures are monitored constantly in the HDD control cabin. As the pipe string is pulled through the drill bore it is supported at the drill exit point by a combination of the pipe rollers and excavators maintaining the correct entry profile.

2.7.10 On completion of the pipe pullback, the drilling machine is de-coupled from the pipe string and the pulling head is removed.

2.7.11 Following the successful installation of the pipeline into the drill bore, a gauge plate mounted on an internal carrier (PIG) will be passed through the bore of the installed pipe string to ensure that the pipes have maintained their shape during the pipe pullback operation.

HDD Tie-Ins, Demobilisation and Reinstatement

2.7.12 The HDD equipment at the drill entry point and the pipe rollers at the drill exit point will be disassembled and transported from site in reverse of the mobilisation process.

2.7.13 The open trench installation of the pipe may not take place at the same time as the HDD section and therefore the bell-hole will be appropriately fenced and secured until both sections are ready to be welded together.

2.7.14 Once the pipeline at each end of the HDD is installed, the sections are ‘tied-in’ (welded together) to the HDD pipe string and the welds are again tested using non-destructive testing and are coated with the liquid epoxy field joint coating.

2.7.15 Excavations are backfilled and compacted using track or wheel-mounted excavators and compaction equipment to a standard that ensures no future subsidence will occur. The bund and membrane site surrounds are removed and the topsoil is replaced.

2.7.16 Any waste generated by the HDD process will either be recycled or removed to a licensed facility in accordance with the Site Waste Management Plan forming part of the CEMP.

2.8 Streets

2.8.1 Unless stated otherwise below, site set-up and reinstatement will be as per section 2.4 and section 2.17.

2.8.2 It is anticipated that the length of street works will be circa 8.6km of the 97km of the replacement pipeline installation. The majority of street works take place in Farnborough, Chertsey and Ashford. The project is not planning on closing any highway other than St Catherines Road, Farnborough. This closure would not prevent access to residential properties.

2.8.3 Working in roads will be planned and undertaken in conjunction with the relevant Highways Authority using the applicable highways authority permitting scheme and/or the requirements of the DCO and the CTMP. This scheme governs the timing, duration, the length of road under traffic management, road diversions, any parking suspension, and any works outside of the normal working hours.

2.8.4 As part of its early engagement with the highway authorities, Esso has agreed to utilise the permit schemes in effect for Surrey County Council and Hampshire County Council in order to best coordinate the street or PRoW works required for the project.

2.8.5 Once a permit has been granted and work is ready to commence, traffic management is installed (in line with the submitted traffic management plan). This will include site fencing of the working area (either a 2m high Heras-type fencing or a 2m high strong-wall fencing). Set-up would be deemed complete when the traffic management is operational and the barrier system and entrance gates are installed. Entrance gates will be placed at each end to allow both plant and worker access. These will be closed and locked when not in use. Once the set-up is completed, utility mark up and alignment demarcation would commence.

2.8.6 A clear running lane of 3.2m must be kept open to allow traffic to pass unhindered.

2.8.7 Once utility services and the pipe alignment for installation have been identified, a floor saw will cut a set of parallel lines through the tarmac to the correct width of the trench.

2.8.8 The trench area would be scanned, then hand-excavated in layers where any known services could be. If nothing is found, the level will then be excavated by the machine (a toothless bucket to be used at all times). The subsoil would be taken from the works area to a laydown area near the works, and these will be taken away either to landfill or for recycling.

2.8.9 When a service or obstruction is found, this area will be excavated either by hand, or by exchanging the excavator with a vacuum excavator to mitigate any operatives from entering the trench.

2.8.10 Pipe sections (length) installed at any one time will be dependent on the length of the working area under traffic management and on location of utilities or any other obstruction found within the trench.

2.8.11 Once the trench is dug, the pipeline will be brought in, welded, coated and tested at ground level and placed in the trench.

2.8.12 At the end of the pipe, a bell-hole will be excavated and supported with supports (known as temporary works). This is to allow the next pipe or pipe string to be welded to the previously laid pipe. The bell-hole will be large enough to allow an operative unhindered access to undertake the welding, coating and testing of the pipes.

2.8.13 Once laid, the trench will be backfilled with imported materials, typically granular fill such as MOT #1. This will be levelled and compacted in layers. If any temporary works are in the trench, these will be removed as the trench is backfilled, as described within the temporary works design. When the backfill is complete, the carriageway will be reinstated in layers of base course and wearing course to match the existing surface.

2.8.14 The traffic management and barrier system can then be moved further along the road, and the process can continue without any breaks. No parking cones will be placed out in advance.

2.8.15 Reinstatement of the highway will be in accordance with the requirements of the permit schemes, the DCO and applicable guidance including from the Highways Authorities and Utilities Committee. These bodies have documented the requirements of how-to reinstatement within the carriageway and footway. This includes the depth and material specifications to be used within different categories of carriageway. The local authorities can core-test all reinstatement, and test for material specification used and confirm the depth of material used.

Property access (crossed by works)

2.8.16 If during this process a driveway is encountered, the fencing will have a gap where the access is required. The works supervisor will inform businesses or residents in advance when the trench will cross their driveway, and again when the pipeline will be lowered into the trench.

2.8.17 Where possible, works will be planned to avoid or reduce restrictions on access to properties. Once the trench is dug, a road plate will be placed over the trench adjacent to the access. The backfilling and re-surfacing will be relatively quick, and the road plate will be removed and then replaced by the construction team during these phases as required by the residents.

2.8.18 Emergency access would always be provided for as required to support the emergency services. Vehicular access would be maintained where practicable.

Reducing impact to road users

2.8.19 The street works will be undertaken within controlled traffic management at all times, with the large proportion being within traffic lights (two-way, three-way and four-way). These will be set up in accordance with the applicable highways authority

permitting scheme and/or the requirements of the DCO, subject to the terms and conditions of the notice.

Reducing disruption to nearby residents, properties and the community

2.8.20 Noise: All activities need to be undertaken as specified in the Noise and Vibration Management Plan that forms part of the CEMP. For example, an acoustic barrier system would be used to soften and muffle sound; these would be placed onto the fencing adjacent to the works at appropriate locations.

2.8.21 Dust: Dust will be mainly generated when using a road saw or a top cutter. This can be supressed with the use of water being sprayed directly onto the blade or material being cut. Further, dust will emanate from vehicle movements and the backfilling process. The road within the works site needs to be kept clean and free from dirt; and dust can also be supressed with a water spray. Backfill material must be conforming and have the correct percentage of water content when delivered from the quarry. These measures would be specified in the Dust Management Plan that forms part of the CEMP.

2.8.22 Light: During the winter months especially, task lighting will be required to work the set hours. This lighting needs to be placed with the focus of the light on the task, ensuring that no direct light causes a nuisance to local residences and passing traffic. Solid barriers or acoustic barriers could be used to contain the light. When the welding process is ongoing, all light from the arc will be shielded from all members of the public and other working operatives at all times. These mitigation measures would be specified in the Lighting Management Plan that forms part of the CEMP.

2.9 Watercourses

2.9.1 Any works within main rivers or ordinary watercourses will be in accordance with a method approved under environmental permits issued under the Environmental Permitting Regulations or the protective provisions at Schedule 9 of the DCO for the benefit of the Environment Agency and the Lead Local Flood Authorities.

2.9.2 For Open Cut watercourse crossings and installation of vehicle crossing points, mitigation measures would include those laid out in (G122). Further details are given below and in the CEMP, Appendix WMP (**Document Reference 8.51**).

2.9.3 Unless stated otherwise below, site set-up and reinstatement will be as per section 2.4 and section 2.17.

2.9.4 Firstly, topsoil striping would stop before the banks of each watercourse, this zone would typically be 10m (from each bank), although this is dependent on the type, size and quality of the vegetation and habitats of the watercourse. This mitigates the risk of surface water runoff, which could be carrying silt from the working area, entering the watercourse, by creating a barrier. This can be supplemented with the use of silt fencing across the width of the working area.

2.9.5 From this point on, the working area would be reduced to a maximum of 10m wide although this could be narrower where conditions allow, such as narrow/shallow watercourses.

2.9.6 Fencing along the outside of the working area will be narrowed at this point to ensure no encroachment onto the watercourse banks beyond the 10m width. The fencing would not be placed down the bank or within the watercourse.

2.9.7 Topsoil and subsoil will not be stored directly adjacent to the watercourse but will be moved further along the working area to reduce the risk of silt laden runoff reaching the watercourse (commitment G184 – '*stockpiles would not be located within 10m of any main rivers or ordinary watercourse crossings'*).

2.9.8 In-stream vegetation within the crossing area would be temporarily translocated within the watercourse slightly upstream or downstream of the works and will be returned to its original position as part of the reinstatement. The bed material will also be stored separately and used for reinstatement.

2.9.9 Only the bank vegetation within the working width will be removed to reduce biodiversity impacts and fragmentation. The species mix will be recorded by the Environmental Clerk of Works so that it can be reflected in the reinstatement, as appropriate.

2.9.10 A suitably-sized flume pipe will be placed in the watercourse (in the direction of the flow). This flume pipe will be sized in line with commitment W4, '*Afflux at temporary main rivers and ordinary watercourse crossings would be maintained at less than 100mm'*. In accordance with commitment G183, '*natural substrate would be provided through temporary watercourse crossings box culverts*'.

2.9.11 Either end of the flume pipe, starting at the upstream, will be sealed to the banks using a system such as Aquadam. This will ensure all the flow is then directed through the flume pipe. If required, scour protection will be placed at the downstream end of the flume to reduce the risk of bed erosion. This then creates a dry working area and maintains the flow of the watercourse during the Open Cut installation.

2.9.12 A haul road is then installed, typically with stone, over one half of the flume pipe to allow connectivity along the working area for plant and vehicles.

2.9.13 To install the pipeline, a trench is then dug to at least 1.2m below the hard bed of the watercourse beneath the flume pipe. The new pipeline is then installed in the trench and backfilled, and the bed material replaced.

2.9.14 When works in the area are complete, the materials used to create the haul road will be removed. The seal around either end of the flume pipe will be slowly removed to allow the gentle return of the watercourse flow and then the flume will be removed.

2.9.15 Reinstatement can then take place. The instream vegetation will be removed from its temporary location and returned to this section of the watercourse. The banks of the watercourse will be replanted and reseeded as part of the reinstatement plans contained within the LEMP. The area of bank reinstatement will be covered with hessian which will encourage plant establishment and reduce the risk of soil erosion. The hessian will naturally degrade in situ as the vegetation grows back.

2.10 Woodland

2.10.1 The generic Open Cut (section 2.5 above) technique will be utilised with the exceptions noted below. The requirements set out in the LEMP are applicable to

working near woodland. Unless stated otherwise below, site set-up and reinstatement will be as per section 2.4 and section 2.17.

2.10.2 When crossing woodland, the detailed design process would seek to reduce the working area to 15m wide although this could be narrowed to as little as 10m.

2.10.3 Trees not being retained will be removed from the working area. These will be cut down to ground level by a specialist contractor. As with typical woodland management, tree stumps will be left in situ, to reduce the ground disruption and for ecological value (for invertebrates during decomposition), providing this does not impede the use of the working area.

2.10.4 The contractor(s) would consider and apply the relevant protective principles set out in the National Joint Utilities Group Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees ('NJUG Volume 4' (2007)), G95. For example, trees being retained will be fenced to protect the trunk and roots from installation activity in line with the Tree Protection Zone recommended in NJUG Volume 4 (2007).

2.10.5 Stumps and topsoil will be removed from the area required for the trench.

2.10.6 Landowners retain rights over felled timber and the method of disposal will require agreement of the landowner. Typically, timber can be used within the woodland for habitat creation, nearby ecological or community projects, or it is recycled.

2.10.7 The Environmental Clerk of Works and arboriculturalist will provide advice when any works to trees such as branch removal are required.

Ancient Woodland

2.10.8 Where the Order Limits run adjacent to Ancient Woodland, the works will comply with the precautionary approach outlined in the Approach to Ancient Woodland and Veteran Tree Strategy in Appendix C of the Outline LEMP (**Document Reference 8.50**).

2.11 Hedgerows

2.11.1 The generic Open Cut (section 2.5 above) technique will be utilised with the exceptions noted below. The requirements set out in the LEMP are applicable to working near hedgerows. Unless stated otherwise below, site set-up and reinstatement will be as per section 2.4 and section 2.17.

2.11.2 The working area would be reduced to a maximum of 10m in width (O1).

2.11.3 Within the typical 36m Order Limits, and taking account of other local considerations, the detailed design will select the least impactful 10m width to use within the Order Limits, to take advantage of gaps within an existing hedge, or reduce the number of trees removed where possible. For example, if there is a tree within the hedgerow, installation will seek to retain the tree by positioning the working area to the side. Similarly, utilising existing gaps or entrances already within the hedgerow will reduce the amount of vegetation to be removed.

2.11.4 Tree felling and removal will be undertaken by a specialist contractor.

2.11.5 Fencing of the working area will be continuous when crossing a hedgerow, creating a barrier between the retained hedge and the working area and taking account of the Tree Protection Zone (TPZ) where practicable.

2.11.6 Topsoil will be stripped from the working area. If the haul road crosses the TPZ of the retained hedge, appropriate ground protection such as matting will be used.

2.11.7 On completion of the works, dead hedging will be installed for all hedges to restore ecological connectivity until permanent reinstatement can be undertaken. Reinstatement will take place in the appropriate season and in accordance with the LEMP (**Document Reference 8.50**) (G93).

2.12 Schools

2.12.1 The generic Open Cut (section 2.5 above) technique will be utilised with the exceptions noted below. Unless stated otherwise below, site set-up and reinstatement will be as per section 2.4 and section 2.17.

2.12.2 Where possible works will be scheduled to take place outside of term time, as agreed with the landowner/tenant.

2.12.3 Where works cannot be completed in a single term break, the working area would be made safe and secure, until the next term break when works would recommence. It may also be necessary to schedule different elements of the work, such as Open Cut and trenchless installation at different times.

2.12.4 Where working within the term time is required, material and vehicles would typically be brought into the working area outside of the start and end of the school day to reduce impact on school-related traffic.

2.12.5 In some cases, as outlined below, narrow working would be adopted to reduce impacts to the school.

2.12.6 Where crossing playing fields, the sports pitches technique will be followed.

2.12.7 Double depth and double-bolted Heras fencing would be adopted on school ground so that children and young people do not access the working area, (unless otherwise agreed with the school).

2.12.8 All project personnel accessing school sites during installation would be required to have valid Criminal Records Bureau (CBR) and (Disclosure and Barring Service) DBS check.

2.12.9 A summary of the works in schools is outlined in table 2.1. For completeness this includes locations where only access is required.

Table 2.1 Summary of works in schools

School	GA Plan	Description of Works
Farnborough Hill	Sheet 35	The pipeline route enters the school in the southwest corner of the school's grounds, with an auger bore under the A325. The drive pit for the auger (TC 019) - will be within the school grounds. From here Open Cut installation follows the school boundary until it reaches Ship Lane. To reduce impacts across school grounds, the project has committed to a narrow working width of 15m (NW18). This work is planned to take place outside of term time.
Salesian School	Sheet 47	The pipeline route enters the school sports fields in an Open Cut installation trench working in the Sports Fields to the west of the A320 Guildford Road. The reception pit for the HDD (TC 030) will be located in the sports fields to the west of the A320. The HDD is routed under the school grounds from the east of the M25 to the west of the A320. Foot access to the school building complex is required to monitor the drilling. No restrictions to timing are anticipated.
Chertsey High School	Sheet 48	Access through the school's entrance is the only works required within the school property to facilitate the installation works through Abbey Rangers. Timing and duration will be managed in conjunction with Abbey Rangers FC.
Clarendon Primary School	Sheet 52	The northwest corner of the playing field is required to accommodate the auger bore reception pit (TC 040) from the crossing of Church Road and also the auger bore below the railway line (TC 041). The pipe will be joined in this location within the reception pit. The remaining school land within the Order Limits is for access to the site. This work is planned to take place outside of term time.
St. James Senior Boys School	Sheet 52	The southwest corner of the playing field is required to accommodate the auger bore drive pit (TC 041) under the railway. A stringing out area has been included in the Order Limits to accommodate a HDD if required. Open Cut narrow working around the eastern boundary of the school at 15m width with a short 5m section in the vicinity of the chapel and wooded area where the route will follow the existing maintenance track. (NW31) The work is planned to take place outside of term time. However, it will be in two phases. The trenchless under the railway line is likely to take place separately to the Open Cut through the school grounds.
Thomas Knyvett College	Sheet 53	Open Cut installation from St James School across the southeast corner of the playing fields, before entering a different land parcel and crossing the A30 Staines Rd.

School	GA Plan	Description of Works
		This work is planned to take place outside of term time.

2.13 Sports Pitches and Golf Courses

2.13.1 The generic Open Cut (section 2.5 above) technique will be utilised with the exceptions noted below. Unless stated otherwise below, site set-up and reinstatement will be as per section 2.4 and section 2.17.

2.13.2 The Open Cut working area would be reduced to a maximum of 15m wide. This does not apply to areas where trenchless activities are required.

2.13.3 Typically, topsoil would not be stripped and ground protection would be used to evenly distribute the load from vehicles and machinery. The type of ground protection would be selected, either matting, timber, metal, rubberised or similar, dependent on the ground conditions and the machinery/plant being used.

2.13.4 The ground protection would be installed in advance of fencing or alignment demarcation. Heras fencing with weighted feet would be used to reduce the need to install fence posts.

2.13.5 The only area that would require topsoil to be removed is above the trench. Turf would be removed, topsoil and subsoil would be stored (separately) away from the trench in a suitable location.

2.13.6 Backfilling may be undertaken in several layers, around 150mm at any time. This is to provide a level and even compression of the soils, and thus a flat reinstated surface. This is particularly important due to the narrow area of topsoil stripping and in order to achieve a safe sporting surface, which is typically flatter than other grassed surfaces (due to previous ground works).

2.13.7 If the stripped turf is being returned to aid a quicker reinstatement of the existing surface, the turf would be stored and maintained (during installation), before being re-laid. Alternatively, reinstatement could be achieved through seeding or turfing with new turf, with like for like species of grass, in accordance with Sport England's guidance '*Natural Turf for Sport*' 2011, or to the specification given by the landowner. For all options, the reinstatement method would be agreed with the landowner or tenant and this may involve the use of specialist contractors.

2.13.8 When installing through golf course fairways where a hole or holes will be closed, alternative access routes for golfers will be agreed with the landowner or tenant. This is to maintain safety for both the installation teams and golfers, with play continuing on the remainder of the course.

2.13.9 Where possible works would be scheduled to take place during the low (or out of) season, as agreed with the landowner/tenant.

2.13.10 A summary of the works in sports pitches and golf courses is outlined in table 2.2. For completeness this includes locations where only access is required.

Table 2.2 - Summary of works in sports pitches and golf courses

Sport field	GA Plan	Description of Works
Oak Park Golf Club	Sheet 28	The pipeline route travels north through the golf course using the sports pitch and golf course technique. To reduce the impacts on two small woodland blocks with bat roost potential and which are connected to Ancient Woodland, the project has committed to a narrow working width of 15m (NW7).
Church Crookham Football Field/Peter Driver Sports Ground	Sheet 31	The route crosses the football field along the southern boundary. To reduce the impact on the football field, the sports pitch and golf course technique would be used in this location. The project has committed to narrow working width of 10m (NW10).
Tweseldown Racecourse	Sheet 31	After Church Crookham Football Field, the route travels northeast across the western edge of the racecourse, using Open Cut installation. The route then enters Bourley and Long Valley SPA/SSSI, where there is a narrow working commitment. The technique will be agreed with the landowner/tenant to reduce impact to the surface of racecourse.
Cove Cricket Club	Sheet 34	The gate into the cricket club and car park, and a route to the south of the Club grounds will be used for access to the working area via Grasmere Road. A small section of the route passes along the southeast boundary of the land. To reduce impacts on woodland near to Cove Brook which has high amenity and landscape value in an urban area, the project has committed to narrow working width of 15m (NW16)
Farnborough Gate Football Field	Sheet 35	The football field would be used as a working area for the trenchless crossing of North Downs railway line, the A331, River Blackwater, and Ascot to Guildford railway line (TC020). The requirements for the trenchless activity will set the methodology for construction, the sports pitch method would not be used in this location.
Pine Ridge Golf Course	Sheet 37	The pipeline route travels northeast through the golf course using the sports pitch and golf course technique. To reduce impacts on a line of large mature trees at Frith Hill several of which have moderate bat roost potential, the project has committed to narrow working widths of 15m (NW20).
Foxhills Golf Club	Sheets 45 & 46	After a trenchless HDD crossing of Accommodation Road (TC 027), the pipeline route travels east through the golf course using the sports pitch and golf course technique. To reduce the impact to the golf course and to thread through TPO trees, the project has committed to narrow working width of 15m (NW26).
Abbey Moor Golf Club	Sheet 48	The route travels east along the northern border of the golf course using the sports pitch and golf technique before a trenchless crossing

Sport field	GA Plan	Description of Works
		(TC031) of the Chertsey Branch railway line. There is an access road from Green Lane to the working area for the trenchless crossing. To reduce the impact to the golf course the project has committed to a narrow working width of 15m (NW27).
Abbey Rangers Football Club	Sheet 48	A HDD trenchless crossing (TC 032) of the A317 would be extended to reduce impacts on the FA standard pitch. The route travels northeast across the football club using the sports pitch and golf course technique before a HDD trenchless crossing (TC 033) of the Chertsey Bourne watercourse. To reduce the impact on the football pitches the project has committed to a narrow working width of 15m (NW28) which will also be used for the stringing areas for TC 032 & TC 033.
WR Sports Club/Ashford Tennis Club	Sheet 52	The route does not pass through the club and therefore the sports pitch technique is not required. The Order Limits cross the entrance from Short Lane, access to the sports facilities would be maintained.

2.14 SANGs

2.14.1 The generic Open Cut (section 2.5 above) technique will be utilised with the exceptions noted below. Unless stated otherwise below, site set-up and reinstatement will be as per section 2.4 and section 2.17.

2.14.2 As per section 2.2.1 construction work in SANGs will be limited to a maximum of two years duration. In addition the following additional measures will be taken:

- The SANG circular walk will be maintained.
- Pedestrian access to the SANG and vehicle access to SANG carparks will be maintained.
- Fencing of compounds within SANGs will be agreed with the relevant planning authority.

2.14.3 A summary of the works in SANGs is outlined in table 2.3.

Table 2.3 – Summary of works through SANGs

SANG	GA Plan	Description of Works
Southwood Country Park SANG	Sheet 33 & 34	The route travels northeast through Open Cut technique, before a trenchless crossing (TC014) of the A327 Ively Road. There is access from Ively Road to the working areas for the trenchless crossing. The route continues north until it reaches the boundary of the Cove Cricket Club. From this point the project has committed to a narrow working width of 15m (NW16) for the remainder of the route until it reaches Cove Road. Within this narrow working area there is a trenchless crossing (TC014a) beneath the Cove Flood Barrier. There is a Site Specific Plan for this location.
Crookham Park (Queen Elizabeth Barracks) SANG	Sheet 30	The route travels northeast through the area using the Open Cut technique. The woodland technique would be used through Wakefords Copse. There is also a short section of highway through Quetta Park which uses the streetworks technique. There are two areas that the project has committed to a narrow working width of 15m wide, NW8 at Ewshot Meadows SINC and NW9 at Wakefords Copse SINC.
Windlemere SANG	Sheet 41	The route travels northeast through the area using the Open Cut technique. There is a trenchless technique (TC021) for the A322 crossing at the western side.
Chertsey Meads SANG	Sheet 48 and 49	The route travels north through the area using the Open Cut technique. There is a narrow working commitment (NW29) in this location. To the north trenchless technique (TC034) will be used for the Thames crossing, which also requires a stringing out area within the SANG.
St Catherines Road SANG (Clewborough)	Sheet 36	Open Cut working at the eastern edge of the SANG for pipe installation A construction compound located in the southern corner to serve the local works (specifically St Catherines Road). A stringing out area has been included in the Order Limits to accommodate a HDD in St Catherines road if required. There is a Site Specific Plan for this location.

2.15 Construction of Above Ground Infrastructure

2.15.1 The construction of the new pigging station at Boorley Green along with the valves and the pressure transducer 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.

2.15.2 The valve area would be excavated. This is an area approximately 3m x 4m. The concrete base would be installed. Then the pipeline would be installed, and the valve correctly positioned. The valve chamber would then be completed around the assembled pipeline and valve.

2.16 Post Installation Phase Activities

2.16.1 On completion of the installation works, the contractor(s) would hydrotest the pipeline before commissioning in accordance with British Standards and the requirements of the Pipeline Safety Regulations 1996.

Final Tie-Ins, Hydrostatic Testing, Gauging and Drying

2.16.2 As rural sections and adjacent obstacles (e.g. trenchless crossings, block valves stations and AGIs) are completed they will be welded together, this is known as the 'tie-ins'.

2.16.3 A feature of the SLP project is the numerous and varied obstacles that hinder linear progressive construction progress. Therefore, pipeline construction phases will be planned around the anticipated durations for specific activities primarily governed by the complex major trenchless crossings, ground conditions, ecological and environmental constraints and the street work sections.

2.16.4 This construction phase planning is considered during the design of the hydrostatic testing philosophy. A major consideration for the location of the hydrostatic test sections is the proximity to dwellings and public access arrangements. Additionally, access to, re-use of and discharge of hydrostatic test water, the elevation of the pipeline route and the location of block valves and AGIs are also factors that affect the hydrostatic testing detailed planning.

2.16.5 Once work is completed on the pipeline sections to be hydrostatically tested, the hydrostatic testing equipment will be mobilised. Initially, cleaning PIGs (Pipeline Internal Gauge, a seal device that is propelled through the inside of the pipeline using either compressed air or water to propel the PIG) runs are carried out to

remove internal debris. A gauge plate is attached to one of the PIGs and the section to be pressure tested is checked to ensure that the shape of the pipeline is acceptable prior to hydrostatic testing.

2.16.6 Hydrostatic testing is carried out in accordance with site and task specific procedures that ensure that members of the public and the workforce are not put at risk. It should be noted that the majority of the pipeline under test is buried and that any exposed pipe at the test end tie-in points will be below ground level. Risk reduction measures include the application of exclusion zones, additional physical barriers around areas of exposed pipe and test fittings, signage, and regular security patrols around the areas under hydrostatic test. All hydrostatic testing equipment will be fully pre-tested and certified and competency assessments of the hydrostatic testing crew will be carried out before the operation starts.

2.16.7 Hydrostatic test water will be sourced from either a local water source in accordance with abstraction permits or will be delivered by road-going water tanker in accordance with the CTMP. The quality of the water used for hydrostatic testing will be tested before it is pumped into the pipeline section. The pipeline section will be filled using hydraulic pumps and the volume will be measured as the section is filled. The pipe section is pressurised in stages in accordance with national and project standards to a pre-defined test pressure and held for 24 hours. On successful completion of the hydrostatic test, the test pressure is gradually reduced in a controlled manner.

2.16.8 The pipeline water will be tested again before it is discharged. The water will either be discharged to another pipeline test section to be re-used, discharged locally in accordance with discharge permits or emptied into a road tanker to be disposed of. The pipeline section will be ‘swabbed’ (running PIGS through repeatedly to dry the pipeline section) to ensure that it is free of water.

2.16.9 Hydrostatic testing of each individual test section will progress as the test sections become available and in accordance with the detailed construction plan.

2.16.10 Each test section will then be dried using ‘super-dry’ air with a low dew point value and the moisture content is assessed. The test section is then sealed and a ‘hold’ period is applied after which the moisture content is checked again. Once it has been confirmed that the moisture content is satisfactory the pipeline is then sealed in readiness for final-ties at a later date. Note that the pipeline may be dried in combined test sections or as an entire pipeline, in any event the maximum permissible moisture content will never be exceeded.

2.16.11 As adjacent hydrostatic test sections are hydrostatically tested/dried, ‘final tie-ins’ are carried out to connect the hydrostatic test sections. The welds made to connect the test sections are known as ‘golden welds’ as these welds will not be subjected to the hydrostatic test. The number of golden welds will be kept to an absolute minimum and they will be subjected to additional forms of non-destructive testing. The final tie-in welds will be coated and the coating shall be tested. The excavations will be backfilled as the work progresses, topsoil will be replaced and these last construction areas will be reinstated.

2.16.12 Once all hydrostatic testing and drying is completed the entire pipeline is internally examined using a calliper inspection gauge tool. The tool is built into a pipeline PIG and propelled using dry air. The calliper inspection gauge tool gives final assurance

of pipeline bore shape and checks for dents that may have been caused during the construction process.

2.17 Reinstatement

2.17.1 Land used temporarily would be reinstated to an appropriate condition relevant to its previous use (G94). Further to the techniques noted above, Landscape and Ecological Reinstatement Plans will be included as part of the LEMP in accordance with Requirement 8(1)(b) of the DCO and will reflect the requirements of section 5 of the LEMP. The contractor will implement the requirements of these plans and the LEMP in the conduct of vegetation reinstatement. In particular:

- In areas where land compaction has occurred or where required by the landowner it may be necessary to pull a series of tines through the affected land to assist with future drainage (G157).
- Topsoil would be returned to its final location at the earliest suitable time of year (G29).
- The contractor would clear all temporary working areas and accesses as the work proceeds, and when they are no longer required for the works. On completion of the construction works, all plant, materials and temporary works/structures would be removed. Where possible, reinstatement of vegetation would generally be using the same or similar species to that removed (subject to restrictions for planting over and around pipeline easements) (G88).
- Hedgerows, fences and walls would be reinstated to a similar style and quality to those that were removed, with landowner agreement (G93).
- A five-year aftercare period would be established for all mitigation planting and reinstatement (G92) and requirement 8 of the DCO.

2.17.2 Where required, weed suppression measures will be applied to the topsoil heap before topsoil replacement. Topsoil is pulled from the heap using excavator buckets and displaced gradually to the correct grade using either excavators or bulldozers as reinstatement progresses and topographic levels are checked regularly by GPS survey equipment to ensure that reinstated levels match the existing profile before construction commenced.

2.17.3 Reinstatement will be completed as much as possible along the route within each hydrostatic test section so that any mechanical works necessary for reinstatement will be completed before hydrostatic testing is carried out. This is to prevent the use of mechanical equipment over the hydrostatically tested pipeline.

2.18 Working Hours

2.18.1 The project is required under the DCO to adhere to normal working hours of 08:00 to 18:00 Monday to Saturday. Sunday or Bank Holiday working is not anticipated as being typical.

2.18.2 Exceptions may be required for extended hours (including where necessary working on a Sunday or Bank Holiday) for activities such as:

- the continuous pulling phase for a major crossing using HDD;

- where daytime working would be excessively disruptive to normal traffic operation; cleaning/testing of the pipeline; or
- overnight traffic management measures (G5).

2.18.3 During the 24-month construction period, the works would encounter environmental and other constraints such as unforeseen ground conditions, weather conditions etc. This may require Sunday and Bank Holiday working, so prolonged disruption in any one area could be limited.

2.18.4 To reduce congestion on the public highways, and to meet the requirements of the local authorities and the police, where practicable, abnormal loads would be transported outside normal working hours.

2.19 Security

2.19.1 Working areas would be appropriately fenced. The choice of fencing would be decided following a risk assessment, relevant to the work location. Specific areas such as compounds may require additional security measures such as lighting, security guards or closed-circuit television. (G85) All fencing along the route would be maintained and checked on a regular basis; entry points via gates would be closed, secured and locked when not in use.

2.19.2 For some locations the fence used may also serve to provide acoustic and visual screening of the work sites and reduce the potential for disturbance of users in the surrounding areas.

2.19.3 Provision of additional fencing on a site by site basis may be used to reduce the potential for impacts on wildlife and trees. Fencing would be regularly inspected and maintained and removed as part of the demobilisation unless otherwise specified (G85).

2.20 Control of Nuisance

2.20.1 In common with other major construction projects, the project recognises the potential nuisance its activities may cause. The principal measures for limiting and controlling potential nuisance are set out in the CEMP. Potential nuisances include light, noise and dust from installation activity. Such nuisance could arise from activities at its compounds and hubs as well as the pipeline installation along the Order Limits.

2.20.2 Appropriate site layout and housekeeping measures would be implemented by the contractor(s) at all construction sites. These may include:

- preventing pests and vermin and treating any infestation promptly. This would include arrangements for the proper storage and disposal of waste produced on site;
- inspecting and collecting any waste or litter found on site;
- locating or designing site offices and welfare facilities to limit the overlooking of residential properties;
- locating designated smoking/vaping areas to avoid significant nuisance to neighbours;

- managing staff/vehicles entering or leaving site, especially at the beginning and end of the working day;
- avoiding the use of loudspeaker systems or radios; and
- managing potential off-site contractor and visitor parking. (G7)

2.20.3 In the absence of a mains electricity supply, super-silent pack generators would be used as an alternative power supply. (G24)

2.20.4 Any activity carried out or equipment located within a logistics hub or construction compound that may produce a noticeable nuisance from dust, noise, lighting etc would be located away from sensitive receptors such as residential properties or ecological sites where practicable (G25).

2.20.5 Lighting would be of the lowest luminosity necessary for safe delivery of each task. It would be designed, positioned and directed to reduce the intrusion into adjacent properties and habitats (G45).

2.21 Welfare

2.21.1 Welfare units and toilets would be provided at all of the compounds during the works where necessary. These would be for the use of the contractor(s) employees. Emptying of effluent, and the removal of any waste would be undertaken by a registered contractor on a regular basis.

2.21.2 Health and safety information and Control of Substances Hazardous to Health (COSHH) data sheets would be displayed within the welfare area.

2.22 Health and Safety

2.22.1 Esso operates its activities in accordance with the Health and Safety at Work Act 1974, and other health and safety legislation. Site-specific methodologies and risk assessments would be produced in accordance to the current legislation prior to any activities taking place. These would identify any potential risks, assess their likelihood and significance, then identify mitigation measures to reduce the risk, likelihood and significance.

2.22.2 Esso would ensure that adequate arrangements are in place to discharge its duties under the Construction (Design and Management) Regulations 2015 (CDM Regulations).

2.22.3 The contractor(s) would be responsible for the production and implementation of the Project Health and Safety Plan in accordance with CDM regulations. This would set out how health and safety matters are managed, risks are identified and reduced in accordance with the current best practices and legal requirements. The Health and Safety Plan would provide and focus on the health and safety of the contractor's staff and workforce and ensure the health and safety of any visitors to the site and its compounds and members of the general public in the vicinity of any activities.

2.22.4 The contractor would be regularly audited on its health and safety performance. All procedures and processes would be periodically reviewed internally by the contractor(s) and by Esso.

2.23 Community Liaison

2.23.1 A Community Engagement Plan would be submitted and approved by the relevant planning authority pursuant to Requirement 15 of the DCO.

2.23.2 Esso is committed to ensuring that the local community and associations are provided with information regarding relevant construction activities. Information relating to the pipeline is and would continue to be readily available on the project website at https://www.slpproject.co.uk/. This would include the project programme with estimated durations, email addresses with helpline numbers for the members of the public or businesses, who wish to request information or make an enquiry relating to the construction activities.

2.23.3 Should any construction related complaints or enquiries be received, they would be discussed and responded to in a timely manner. A central Environmental Log would be set up. The log would be available to view by the local authority if requested. It would be a living document and be kept up to date and referred to on a regular basis. The log would record all comments and complaints made to the site, together with resulting actions and outcomes. (G9).

2.24 Environmental Management

2.24.1 Esso requires that its main works contractor(s) can demonstrate an Environmental Management System certified to ISO 14001. Other contractor(s) would be expected to work to the principles of ISO 14001. The contractor would be responsible under legislation and the Contract for minimising and controlling the potential environmental impacts of all contract activities.

3 Embedded Construction Design Measures

3.1.1 During the environmental assessment process, measures for the protection of the environment have been embedded into the design. Many of these have influenced the final location of the Order Limits avoiding environmental features where practicable. However, there are also embedded measures designed to avoid or protect environmental features which have been identified within the Order Limits, but which are not reflected in the Work Plans. Table 3.1 contains a list of the construction commitments that will be embedded into the project design by the contractor(s) and taken into account during installation as appropriate.

Table 3.1: Embedded Design Measures

Ref	Location	National Grid Reference	Embedded Design Measure	Justification
Project wide				
O1	Project wide	Project wide	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.
O7	Project wide	Project wide	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.
Route				
D5	North of Cross Lane	SU5426519106	Locate haul road to the west away from trees in Priority Habitat.	To avoid woodland in Priority Habitat.
D6a	South of Stakes Lane	SU5609021785	The construction compound measuring up to 55 metres by 52 metres to be located at Stephens Castle Down (Works No. 4F and shown on Sheet 6 of the Works Plan at CO-4F) is no longer required and will be removed from the works description in Schedule 1. An area adjacent to the working width measuring 15 metres by 55 metres will still be required as part the construction of a trenchless crossing (TC002) beneath Stake's Lane.	To respond to comments raised by the SDNPA and Historic England.
D7	North of Sailors Lane	SU5849323046	Ensure pipe alignment is located to the west away from woodland block.	To avoid impact on Priority Habitat – large woodland block.
D9	Kilmeston Road	SU5941424044	Use existing gap in hedgerow.	To reduce impact on north hedge which is Priority Habitat.

Ref	Location	National Grid Reference	Embedded Design Measure	Justification
D13	East of Hinton Ampner	SU6124825552	Use existing gap to avoid Ancient Woodland belt.	To avoid classified Ancient Woodland.
D19	Rabbit Copse, West of Warnford.	SU5847323090	Use widened Order Limits to reduce impact on Priority Habitat.	To provide flexibility to reduce impact on Rabbit Copse Priority Habitat.
D21	South of Green Lane north A272	SU6393028657	Locate haul road to the west to use gap in hedge.	To reduce tree loss.
D22	Clinkley Road, north A272	SU6432929324	Locate haul road to the west to use gap in hedge.	To reduce tree loss.
D24	South of Kitwood Lane	SU6715332920	Locate haul road to use existing gaps in hedge in two locations.	To avoid removal of mature trees.
D25	Hawthorn Road	SU6761233601	Locate haul road to use existing hedge gaps.	To avoid woodland Priority Habitat.
D30a	Meon Valley Railway, north of Woodside Lane	SU 70106 35655	Reduce working width through woodland belt.	To reduce impacts to Priority Habitat and visual impacts for users of public rights of way (PRoW).
D33	Selborne Road, Chawton.	SU7214337620	Use widened Order Limits and the LoD to the west to reduce impacts to woodland Priority Habitat.	To enable construction within an alignment that reduces impacts to woodland Priority Habitat.
D40	North of lane to Froyle	SU7570542510	Use widened Order Limits to take account of historic landfill.	To provide flexibility to avoid historic landfill if required.
D41	Upper Froyle	SU7595542874	Use further widened Order Limits and the LoD to the west.	To reduce impact on trees on the east side.
D44	South of Gid Lane	SU7606442980	Use widened Order Limits to allow flexibility to avoid tree roots.	To allow for routing to avoid the root protection areas of two mature trees.
D45	South of Gid Lane,	7606342997	Use existing gaps in hedge.	To avoid mature trees.

Ref	Location	National Grid Reference	Embedded Design Measure	Justification
	Ryebridge Stream			
D47	West of Hole Lane	SU7878646500	Locate haul road to use existing hedge gap.	To lessen impact on trees and scrub.
D48	North side of Dippenhall Lane, Crondall	SU7555242409	Locate haul road to the west to use existing access.	To reduce impacts to woodland block which is Priority Habitat.
D55	Between Dippenhall Road and Crondall	Location confidential	Use widened Order Limits to avoid protected species habitat.	To avoid impacts to habitat for a protected species.
D56	Land north of Heath Lane	SU 80556 49011	Use widened Order Limits to avoid mature oak trees.	To reduce impacts to mature trees in the woodland belt.
D58	South of A287	SU8061749680	Locate haul road to the west.	To avoid Ancient Woodland and Site of Importance for Nature Conservation (SINC).
D60	Bourley and Long Valley SSS/SPA	SU8315153174	Use the existing track north of Aldershot Road rather than habitat area as haul road.	To lessen impacts on Special Protection Area (SPA) Site of Special Scientific Interest (SSSI), Flood Zone and Priority Habitats.
D65	Naishes Lane, Ewshott,	SU8139750605	Use widened Order Limits and LoD to avoid Pond 77.	To avoid Pond 77.
D68	Frith Wood	SU8909958085	Locate haul road to east. Narrow working width.	To maintain the line of mature trees.
D69	Frith Wood	SU8955358202	Use space within Frith Hill forestry road to reduce impacts on mature trees and possible historic feature.	To reduce impacts on mature trees and the possible historic feature.
D71	Farnborough Hill School	SU 87092 56214)	Use widened Order Limits to avoid mature trees.	To avoid affecting mature trees which are currently near the proposed alignment.
D80	Colony Bog and Bagshot SSSI/SPA Heathland	SU9092259795 to SU9164760904	Use the existing Ministry of Defence track plus narrow working area.	To reduce the impact on the heathland habitat and mature trees.

Ref	Location	National Grid Reference	Embedded Design Measure	Justification
D82	Colony Bog and Bagshot SSSI/SPA Wetland	SU9209461119	Align the pipe on high ground to the north or lay in existing track.	To avoid the impact on wetland/bog SSSI.
D83	Colony Bog and Bagshot SSSI/SPA Wetland	SU9277461503	Align the pipe for a short section along Red Road to further avoid wetland/bog.	To avoid the impact on wetland/bog SSSI.
D84	Colony Bog and Bagshot SSSI/SPA	SU9380061676	Ensure trenchless working area for the A322 is outside of SSSI/SPA.	To reduce the impact on the SSSI/SPA.
D90	Foxhills Golf Course	TQ 00116 65204 to TQ 01939 65252	Reduce the working width to 15m through golf course.	To reduce impacts to GCN habitat, landscape and golf course use.
D92	Steep Hill	SU9668063360	Use extended Order Limits to edge of field boundary just north of Steep Hill.	To provide adequate flexibility to route around planned sand school for horse riding activities.
D106	St James Senior Boys' School (Grid ref: TQ 06611 72028 to TQ 06705 72159)	Adjust pipeline alignment to the east.	To avoid the disturbance of school activities.	St James Senior Boys' School (Grid ref: TQ 06611 72028 to TQ 06705 72159)

4 Good Practice Measures

4.1 Introduction

4.1.1 As part of the Environmental Impact Assessment process and planning assessment, good practice measures have been identified that would reduce impacts from the project on the environment. These are generally measures that would normally be implemented on a well-run construction site, but also include a number of good practice measures that are specific to the project and its location. Many of these good practice measures are included in this CoCP, and their implementation is secured under Requirement 5 of the DCO. Please note that additional measures and mitigation are also included under other DCO mechanisms such as the SSPs, CEMP, CTMP and LEMP that complement these CoCP measures.

4.1.2 Tables 4.1 to 4.8 show good practice measures that would be implemented. These are minimum standards that are binding for the contractor(s) whilst working on the project. Implementation of these good practice measures has been assumed in the assessment of the project within the ES and planning assessment.

4.1.3 General good practice measures that are applicable to a number of topics and relevant across the project can be found in Table 4.1. Tables 4.2 to 4.8 list the good practice measures which are relevant to a specific topic, such as biodiversity or water. Each good practice measure has been assigned a reference number, for example (G7). This is for ease of cross-reference to other documents and chapters such as the REAC (see Chapter 16 Environmental Management and Mitigation within the ES).

4.2 General Good Practice Measures

4.2.1 Table 4.1 contains general good practice measures.

Table 4.1: General Good Practice Measures

Ref	Good Practice Measure
G2	The contractor(s) would provide a series of reviewed methodologies. The number of construction activities subjected to this process would be decided on a risk-based approach and could include site preparation, pipe-laying, trenchless crossings and reinstatement. Each methodology would include the measures that need to be undertaken to meet the requirements outlined in the CEMP. Methodologies would be reviewed and accepted by the Employer's Representative.
G3	A suitably experienced Environmental Manager would be appointed for the duration of the construction phase. A qualified and experienced Environmental Clerk of Works (ECoW) would be available during the construction phase to advise, supervise and report on the delivery of the mitigation methods and controls outlined in the CEMP. The ECoW would be supported as necessary by appropriate specialists.

Ref	Good Practice Measure
G6	Welfare facilities and cabins would be located in the compound areas. Where the working area is an excessive distance from the nearest compound, mobile welfare units would be deployed to move with the crew as works progress. No living accommodation would be provided in the compounds or the working areas.
G7	Appropriate site layout and housekeeping measures would be implemented by the contractor(s) at all construction sites. These may include: • preventing pest and vermin control and treating any infestation promptly. This would include arrangements for the proper storage and disposal of waste produced on site; • inspecting and collecting any waste or litter found on site; • locating or designing site offices and welfare facilities to limit the overlooking of residential properties; • locating designated smoking/vaping areas to avoid significant nuisance to neighbours; • managing staff/vehicles entering or leaving site, especially at the beginning and end of the working day; • avoiding the use of loudspeaker systems or radios; and • managing potential off-site contractor and visitor parking.
G9	A central Environmental Log would be set up. The Log would be available to view by the local authority if requested. It would be a living document and be kept up-to-date and referred to on a regular basis. The Log would record all comments and complaints made to the site, together with resulting actions and outcomes.
G11	Runoff across the site would be controlled by the use of a variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding.
G12	There would be 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 emergency).
G13	Protection of earthworks and soil would be managed by methods such as covering, seeding or using water suppression where appropriate.
G15	Wheel washing would be provided at all logistics hubs and large compound access points on to the highway. An adequate supply of water would be made available at these locations at all times.
G17	Materials and equipment would not be moved or handled unnecessarily.
G18	Bonfires and the burning of waste material would be prohibited.
G19	When loading and unloading materials from vehicles, including pipes and excavated materials, drop heights would be limited.
G20	Water assisted road cleaners would be deployed on public roads where necessary to prevent excessive dust or mud deposits.
G22	Plant and vehicles would conform to relevant applicable standards for the vehicle type, would be correctly maintained and operated in accordance with manufacturer's recommendations and in a responsible manner.
G23	All plant and vehicles would be required to switch off their engines when not in use and when it is safe to do so.
G24	In the absence of a mains electricity supply, super silent pack generators would be used as an alternative power supply. A generator shall be considered 'super silent' if it meets the following criteria:

Ref	Good Practice Measure
	• has a maximum noise output of 69 dB(A) at 7m; • is fitted with a silencer in the diesel combustion exhaust system; and • includes a layer of barrier material within the casing of the generator to reduce noise breakout.
G25	Any activity carried out or equipment located within a logistics hub or construction compound that may produce a noticeable nuisance from dust, noise, lighting etc would be located away from sensitive receptors such as residential properties or ecological sites where practicable.
G26	Construction traffic movements would be kept to the minimum reasonable for the effective and safe construction of the project.
G27	The name and contact details for the project would be displayed at the entrance to all compounds. This would include an emergency number.
G28	Construction workers would undergo training to increase their awareness of environmental issues. Topics would include but not be limited to: • dust management and control measures; • location and protection of sensitive environmental sites and features; • adherence to environmental buffer zones; • noise reduction measures; • working with potentially contaminated materials; • flood risk response actions; and • agreed traffic routes, access points etc.
G29	Topsoil would be returned to its final location at the earliest suitable time of year.
G44	The project would be run in compliance with all relevant legislation, consents and permits.
G77	A Site Waste Management Plan (SWMP) would be developed prior to construction. The contractor(s) would maintain and monitor the SWMP throughout the construction phase and oversee that any sub-contractor(s) adhere to the SWMP.
G179	An Emergency Action Plan would be developed for the construction phase which would outline procedures to be implemented in case of unplanned events such as site flooding, pollution incident, disease outbreak etc.

4.3 Biodiversity Good Practice Measures

4.3.1 Biodiversity surveys have been carried out along the project corridor. These have been used to inform the selection of the project corridor, avoiding sensitive features such as Ancient Woodland and Great Crested Newt (GCN) ponds, where practicable. These surveys would be supplemented by pre-construction surveys if existing baseline survey data need to be updated or supplemented. Ghost applications for protected species licences have been submitted to Natural England with respect to GCN, sand lizards, badgers and dormice. A Protected and Controlled Species Compliance Report has been produced to demonstrate compliance with legislation for other species across the project.

4.3.2 A Habitat Regulations Assessment (HRA) Report (**Application Documents APP-130 and APP-131**) has been produced which provides method statements for working within Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham Special Area of Conservation (SAC). The Order Limits also cross 24 non-statutory designated sites. All hedgerows within the Order Limits have been assessed under the Hedgerows Regulations 1997 for their biodiversity, landscape and cultural heritage importance.

4.3.3 The design evolution of the project has avoided many features of biodiversity importance (see Chapter 4 Design Evolution in the Environmental Statement). In addition, good practice measures have been identified and committed to by the project. Table 4.2 contains the good practice measures particularly relevant to Biodiversity topics. Where restrictions to working are required due to ecological seasonality, e.g. for hibernation or breeding of protected species, standard timings have been indicated. However, due to alterations in weather patterns and temperatures from year to year, the restricted season may alter. It would be at the discretion of the ECoW in consultation with Natural England, where applicable, to decide the actual dates for restriction of works (G34).

4.3.4 Other good practice measures that are also relevant to Biodiversity are contained within different topic areas and measures within documents such as the Outline CEMP and Outline LEMP that fall under separate requirements of the DCO. The areas of reduced working widths within Annex A and the trenchless crossings within Annex B also provide significant reductions in biodiversity impact.

Table 4.2: Biodiversity Good Practice Measures

Ref	Good Practice Measure
G34	Where restrictions to working are required due to ecological seasonality, e.g. for hibernation or breeding of protected species, standard timings have been indicated. However, due to alterations in weather patterns and temperatures from year to year, the restricted season may alter. It would be at the discretion of the ECoW in consultation with Natural England, where applicable, to decide the actual dates for restriction of works.
G35	Bird Breeding Season: The assumption would be that vegetation with the potential to support bird nests would not be removed during the breeding bird season (March to August inclusive). If any works become necessary during the breeding bird season, works would be supervised by an ECoW. Appropriate protection measures would be put in place should active nests be found. These would include exclusion zones around active nests until chicks fledge or nests become inactive as determined by monitoring by the ECoW.
G41	The ECoW would monitor that the works proceed in accordance with relevant environmental DCO requirements and adhere to the required mitigation measures. The ECoW would also be involved with any targeted additional mitigation strategies that may be required.
G43	The contractor(s) would comply with relevant protected species legislation including with regards to badgers, bats, dormice, otters, water voles, sand lizards, great crested newts and Schedule 1 birds. Appropriate licences would be obtained where necessary from Natural England for all works affecting protected species as identified by the Environmental Statement and through pre-construction surveys. All applicable works would be undertaken in accordance with the relevant mitigation requirements and conditions set out in those licences.
G45	Lighting would be of the lowest luminosity necessary for safe delivery of each task. It would be designed, positioned and directed to reduce the intrusion into adjacent properties and habitats.

Ref	Good Practice Measure
G47	A programme of post-construction monitoring and objectives/targets for designated ecological sites, would be agreed and implemented in accordance with DCO requirements at the following sites: • Bourley and Long Valley SSSI; • Colony Bog and Bagshot Heath SSSI; • Chobham Common SSSI/NNR; and • Chertsey Meads LNR The programme and content of post construction monitoring would be agreed with Natural England and recorded within the Landscape and Ecological Management Plan.
G48	Working within ecologically designated sites would be controlled using a variety of methods. These would take account of the reasons for designation to identify the appropriate techniques to reduce impacts. This could include to limit the number of compounds, reduce corridor widths and use lighter vehicles within the sites.
G49	A fish rescue would be undertaken at any watercourse crossings that would require isolation and dewatering, to prevent fish being trapped, injured or killed during dewatering. Fish would be returned to suitable habitat on the same water body unaffected by the works. An experienced contractor would undertake the work and, if required, appropriate authorisation will be obtained from the Environment Agency for such a rescue.
G60	Where there would be a risk of animal entrapment, a means of escape would be installed into all excavations left open overnight.
G62	Vegetation arisings would be disposed of responsibly. Small quantities may be reused on site to create ecological habitat.

4.4 Water Good Practice Measures

4.4.1 Desk based assessments and site surveys were undertaken to enable assessment of groundwater, surface water and flood risk issues. This included information from borehole records and project ground investigations. A Flood Risk Assessment was carried out and submitted to the Environment Agency for comment. A Water Framework Directive assessment has been produced in relation to the risk posed to the river basin objectives and measures.

4.4.2 As part of the design evolution, large areas of floodplain were avoided by the project and trenchless crossings have been used on some watercourses. In addition, good practice measures have been identified and committed to by the project. Table 4.3 contains good practice measures specifically relevant to Water topics.

4.4.3 Other good practice measures that are also relevant to Water are contained within different topic areas, and measures within documents such as the Outline CEMP Outline Water Management Plan that fall under separate requirements of the DCO.

Table 4.3: Water Good Practice Measures and Mitigation

Ref	Good Practice Measures and Mitigation
G117	Wash down of vehicles and equipment would take place in designated areas within construction compounds. Wash water would be prevented from passing untreated into watercourses and groundwater. Appropriate measures would include use of sediment traps.
G118	The detailed design for HDD would include depth and profile and consider methods to reduce the risk of groundwater breakout during HDD.
G119	Potentially hazardous materials used during construction would be safely and securely stored including use of secondary containment where appropriate.
G121	All refuelling, oiling and greasing of construction plant and equipment, would take place above drip trays and also away from drains as far as is reasonably practicable. Vehicles and plant would not be left unattended during refuelling. Appropriate spill kits would be made easily accessible for these activities.
G122	For Open Cut watercourse crossings and installation of vehicle crossing points, mitigation measures would include to: • only use a 10m working width for Open Cut crossings of a main or ordinary watercourse whilst still ensuring safe working; • install a pollution boom downstream of the works; • use and maintain temporary lagoons, tanks, bunds, silt fences or silt screens as required; • have spill kits and straw bales readily available at all crossing points for downstream emergency use in the event of a pollution incident; • place all static plant such as pumps in appropriately sized spill trays; • prevent re-fuelling of any plant or vehicle within 15m of a watercourse; • inspect all plant prior to work adjacent to watercourses for leaks of fuel or hydraulic fluids; and • re-instate the riparian vegetation and natural bed of the watercourse using the material removed when appropriate on completion of the works and compact as necessary. If additional material is required, appropriately sized material of similar composition would be used.
G126	Where new or additional surfacing is required on any access tracks and compound areas, these would be permeable surfaces where ground conditions allow.
G127	The contractor(s) would subscribe to the Environment Agency's Floodline service which provides advance warning of potential local flooding events and subscribe to the Met Office's Weather Warnings email alerts system and any other relevant flood warning information. The contractor(s) would implement a suitable flood risk action plan which would include appropriate evacuation procedures should a flood occur or be forecast.
G128	The contractor(s) would comply with all relevant consent conditions or DCO provisions regarding de-watering and other discharge activities. This would particularly be with regard to volumes and discharge rates and would include discharges to land, water bodies or third-party drains/sewers.
G131	River bank and in-channel vegetation would be retained where not directly affected by installation works.
G134	Temporary stanks would be installed within the trench prior to undertaking dewatering/draining activities, to prevent migration of water within the trench.
G142	Fuels, oils and chemicals would be stored responsibly, away from sensitive water receptors. They would be stored >15m from watercourses, ponds and groundwater dependent terrestrial ecosystems.
G143	The quality of water generated by dewatering would be tested prior to discharge.

Ref	Good Practice Measures and Mitigation
G144	As part of negotiations with landowners within the Order Limits which are affected by the project, active private water supplies would be identified with the landowner. Appropriate mitigation would be considered during construction.
G183	Natural substrate would be provided through temporary watercourse crossings box culverts.
G185	Temporary haul and access road construction material within Flood Zone 3 and areas of High and Medium Risk of Flooding from Surface Water (RoFSW) would be removed at the end of the construction phase and the ground surface would be re-instated to pre-project levels.
G198	The project would incorporate appropriate surface water drainage measures into its final design for the haul roads and access tracks so that they do not lead to a significant increase in flood risk.
W12	For private water supplies (PWS) the following would be put in place: • In the event of a landowner or tenant complaining that installation activities have affected their PWS, an initial response would be provided within 24 hours. • Where the installation works have affected a PWS, an alternative water supply would be provided, as appropriate. • In the event of a significant spill during construction: ➢ all landowners/tenants would be contacted within 24 hours, within 250m of the spill, to determine if there are any PWS that might be affected; ➢ an assessment of the likelihood of groundwater contamination supplying identified PWS would be undertaken; ➢ where requested by the relevant landowner, monitoring of well water would be undertaken for a determined period of time, taking into account pollution travel time in groundwater, to determine whether pollution has occurred; and • where a PWS is affected, an alternative water supply would be provided, as appropriate.
W14	Temporary sheet piling or similar for control of groundwater would be put in place at the following locations unless a detailed assessment is undertaken which demonstrates that no building or infrastructure is at risk of differential settlement: • Near the junction of Roakes Avenue and Canford Drive, Chertsey (TQ048657). • Southeast of Jubilee Church, Chertsey (TQ049658). • Junction of Chesterfield Road and Woodthorpe Road, Ashford (TQ059716). • To the southwest of the Esso West London Terminal storage facility, West Bedfont (TQ068733).
W15	Construction Compound 33 (DCO Works No 5A) would be sized and located so that it does not sit within FZ3 or within 8m of the top of bank of the watercourse.
W16	The project would raise temporary buildings to a maximum of 1m above ground level which is above the 1%AEP (1:100 year) event at the Mead Lane Construction Compound (DCO Works No 5N).
W17	The project would locate any temporary buildings outside of FZ3 at the Shepperton Road North Construction Compound (DCO Works No 5P).
W19	There would be no land raising undertaken in locations identified as Flood Zone 3

4.5 Historic Environment Good Practice Measures

4.5.1 Desk top studies were undertaken to identify historic assets within the Order Limits and those up to 1km away where the setting may be affected by the project. Walkover surveys were also undertaken to confirm the desktop findings. These studies and surveys included consideration of archaeological remains, historic buildings and historic landscapes including some designated sites such as Scheduled Monuments and Listed Buildings. A targeted geophysical survey was undertaken to identify hidden archaeological features. Historic England have been consulted during the assessment. An Archaeological Mitigation Strategy (AMS) has been produced and submitted to the local authority archaeologists for comment. It identifies where trial trenching would take place which would, in turn, identify where a programme of archaeological work (excavation, strip, map and sample, topographic survey, palaeoenvironmental and geoarchaeological sampling and analysis and targeted watching brief) would be required. The baseline and assessment of other topics, such as effects of changes in groundwater on heritage assets and the landscape and visual assessments, have also been taken into account within this assessment.

4.5.2 As part of the design evolution, known high value heritage assets have largely been avoided. For example, a trenchless crossing has been committed to under the Basingstoke Canal Conservation Area to reduce any effects on the canal and its setting. A number of good practice measures relevant to the Historic Environment would be included within documents secured by Requirement 11 (Archaeology) within the DCO and are therefore not repeated here. Measures within other topic areas and covered by other DCO requirements would also be relevant to the Historic Environment.

4.6 Landscape and Visual Good Practice Measures

4.6.1 Landscape information has been collated for designated sites and landscape character. Aerial photography and winter and summer site visits were carried out to identify existing vegetation scale, location and character and identify areas of potential screening vegetation. In addition, tree surveys were undertaken to identify notable trees and tree groupings across the project. Representative viewpoints were discussed with the local planning authorities and additional viewpoints chosen following requests from the South Downs National Park Authority. Ancient Woodland and Tree Preservation Orders (TPOs) have been identified along with registered common land, open access land, Green Belt and other green spaces.

4.6.2 As part of the design evolution, areas of classified Ancient Woodland have been avoided. Some areas of potential Ancient Woodland (<2ha) lie within the Order Limits. Design alignments, reduced width working and trenchless crossings all reduce or avoid the impacts on trees and woodland within and near to the Order Limits. Table 4.4 contains good practice measures particularly relevant to Landscape and Visual topics.

4.6.3 All land used temporarily would be reinstated to an appropriate condition relevant to its previous use. This includes the working area and the land within which the pipeline is installed.

4.6.4 Other good practice measures that are also relevant to Landscape and Visual are contained within different topic areas and measures within documents such as the Outline CEMP and Outline LEMP that fall under separate requirements of the DCO. The areas of reduced working widths within Annex A and the trenchless crossings within Annex B also provide significant reductions in landscape and visual impact.

Table 4.4: Landscape and Visual Good Practice Measures

Ref	Good Practice Measure
G86	Works to notable, TPO and veteran trees, where at risk of damage, would be supervised by the ECoW and supported by an experienced aboriculturalist.
G91	The contractor(s) would retain vegetation where practicable. As a minimum the contractor will retain the vegetation set out in the vegetation retention drawings.
G92	A five-year aftercare period would be established for all mitigation planting and reinstatement.
G93	Hedgerows, fences and walls would be reinstated to a similar style and quality to those that were removed, with landowner agreement.
G94	Land used temporarily would be reinstated to an appropriate condition relevant to its previous use.
G97	Where woodland vegetation is lost and trees cannot be replaced due to the restrictions of pipeline easements, native shrub planting approved by Esso would be used as a replacement.

4.7 Soils and Geology Good Practice Measures

4.7.1 Desk based studies were undertaken from published sources such as historical mapping, aerial photography, geological mapping and reports on potentially contaminated sites. Mineral planning authorities and mineral extraction operators were contacted. Targeted site visits were carried out, and project and historic ground investigation data used.

4.7.2 As part of the design evolution, geological sites, potentially contaminated sites, landfills and minerals resources and operations were avoided where practicable. In addition, the pipeline itself has been designed to limit risks from unstable ground and withstand deterioration from soils and water contaminants. Table 4.5 contains good practice measures particularly relevant to Soils and Geology.

4.7.3 Other good practice measures that are also relevant to Soils and Geology are contained within different topic areas and measures within documents such as the Outline CEMP and Outline LEMP that fall under separate requirements of the DCO.

Table 4.5: Soils and Geology Good Practice Measures

Ref	Good Practice Measure
G71	For all areas, the following strategic approach would be taken for the management of both known and unknown land contamination: • a desk based qualitative risk assessment would be undertaken on the basis of available information to ascertain areas of known and unknown contamination; • working methodologies would be produced based on the assessment; • contingency plans would be developed for dealing with various forms of known or unknown contamination to allow work to progress with limited delay. These procedures would clearly define methods for dealing with any areas of unexpected contamination to manage immediate risks and prevent any contamination, ground gas, airborne contaminants or odour spreading from the affected area, and for appropriate disposal. Measures would contain protocols for dealing with areas of potential asbestos-containing materials, should they be encountered. For areas where potential contamination is known or strongly suspected to be present as a result of past activities, the following would also be undertaken: • ground investigation information would be shared and developed as appropriate; • risks to receptors would be assessed, and mitigation and working methods to control those risks would be developed. Risks would include: encountering contaminated dust, soils and groundwater; and where the presence of ground gas and/or vapours may lead to confined space risks, such as in excavations; • a Suitably Experienced Person (SEP) would ensure that risk areas are identified, working methods followed and mitigation carried out appropriately; • made ground and materials known or strongly suspected of being contaminated would be segregated from natural and inert materials; and • ground arisings deemed unsuitable for re-use within the project would be disposed of appropriately for example to a soil treatment centre or landfill.
G72	A Land Contamination SEP would be appointed. They would have practical experience in brownfield earthworks and be able to use their professional judgment to take a proportionate approach to the assessment of potential for ground contamination based on the desk study information and field observations. Their work would be on a targeted basis.
G74	Excavation materials identified by the Watching Brief as being potentially contaminated and unsuitable for re-use within the project would be segregated from other material and transported off-site in suitable vehicles for off-site testing and subsequent disposal. Vehicles would contain and cover the materials to prevent loss of leachate, dust or other material during transport.
G75	Where the route passes through areas where there are active Environmental Permits (for example authorised landfill sites), the contractor(s) would work with the permit holder to comply with the permit requirements. This could include: • seek agreement from permit holders and regulators to allow works to proceed; • reinstatement of surface restoration materials; • reinstatement of artificial geological barriers (where present); and • if applicable to the site, work in accordance with relevant quality assurance procedures.
G78	The contractor(s) would be made aware of any known risk of encountering unexploded ordnance following an appropriate risk assessment. The contractor(s) would implement mitigation measures advised by the risk assessment.

4.8 Land Use Good Practice Measures

4.8.1 A desk-based study was carried out including use of Ordnance Survey maps and aerial photography. In addition, information was gained from land agents including by questionnaire.

4.8.2 During the design evolution, main settlements have been avoided where practicable. In addition, due to further route alignments, demolition of residential properties has been avoided and impacts to ancillary buildings limited. Table 4.6 contains good practice measures particularly relevant to Land Use.

4.8.3 Other good practice measures that are also relevant to Land Use are contained within different topic areas and measures within documents such as the Outline CEMP and Outline LEMP that fall under separate requirements of the DCO.

Table 4.6: Land Use Good Practice Measures

Ref	Good Practice Measure
G79	Pedestrian access to and from residential, commercial, community and agricultural land uses would be maintained throughout the construction period. Vehicle access would be maintained where practicable. This may require signed diversions. The means of access would be communicated to affected parties at least two weeks in advance.
G80	Where field to field access points would require alteration as a result of construction, alternative field access would be provided in consultation with the land owner/occupier. Recessed field access from local roads would be reinstated where agreed with the landowner.
G82	Drainage surveys would be undertaken prior to construction.
G83	Interference of sporting (comprising hunting, shooting and fishing) activities would be kept to a minimum having regards to the need to maintain a safe working environment for both contractors and users of the land and water. This would include, where necessary, temporary cessation of sporting activities.
G84	Existing water supplies for livestock would be identified pre-construction. Where supplies would be lost or access compromised by construction works, temporary alternative supplies would be provided. Water supplies would be re-instated following construction.
G85	Working areas would be appropriately fenced. The choice of fencing would be decided following a risk assessment, relevant to the work location. Specific areas such as compounds may require additional security measures such as lighting, security guards or CCTV. For some locations the fence used may also serve to provide acoustic and visual screening of the work sites and reduce the potential for disturbance of users in the surrounding areas. Provision of additional fencing on a site by site basis may be used to reduce the potential for impacts on wildlife and trees. Fencing would be regularly inspected and maintained and removed as part of the demobilisation unless otherwise specified.

4.9 People and Communities Good Practice Measures and Mitigation

4.9.1 Desk-based studies were carried out to understand the environmental, social and economic conditions in the study area involving use of maps, aerial photographs and statistical data. Identification was made of potentially sensitive receptors. In addition, discussions were held with consultees including Hampshire and Surrey County Councils.

4.9.2 The People and Communities assessment draws on a number of technical notes. The Traffic and Transport Technical Note compiled using data from the Department for Transport, Hampshire and Surrey County Councils and additional traffic surveys which were commissioned for the project. This included bus service information, journey times, and collisions. A Traffic Assessment has also been produced. The Air Quality Technical Note collated air quality management area (AQMA) information and Defra background maps for background air quality concentrations. Locations of ecological receptors were obtained for statutory and non-statutory sites and Ancient Woodland which would potentially be sensitive to noise, air quality changes or dust deposition.

4.9.3 During the design evolution, community facilities have been avoided where practicable. In addition, due to further route alignments, demolition of residential properties has been avoided. Table 4.7 contains good practice measures and mitigation particularly relevant to People and Communities including traffic and transport, noise and vibration and air quality measures.

4.9.4 Other good practice measures that are also relevant to People and Communities are contained within different topic areas and measures within documents such as the CEMP that fall under separate requirements of the DCO.

Table 4.7: People and Communities Good Practice Measures and Mitigation

Ref	Good Practice Measure or Mitigation
G98	Noise and vibration from construction plant and machinery impacts would be mitigated by adopting measures in the following hierarchy: • control at source – for example the selection of quieter equipment; • the choice of location for equipment on site; • control of working hours; and • the provision of acoustic enclosures around equipment or barriers around work sites.
G114	All designated PRoW would be identified, and any potential temporary closures applied for/detailed in the DCO. All designated PRoW crossing the working area would be managed, including National Trails, with access only closed for short periods while construction activities occur.
G173	The project would consult with educational facilities within the Order Limits to co-ordinate the construction timetable to reduce impacts.
PC1	The project would work with the Chertsey Agricultural Show to limit impacts to the Show at Chertsey Meads and along Mead Lane.
PC2	The project would work with the South Downs National Park Authority to limit impacts on major organised events taking place along the South Downs Way (SDW). Provided that the SDNPA has provided at least 4 weeks' notice of the event and its duration, the project will keep the SDW PRoW open

Ref	Good Practice Measure or Mitigation
	(without use of the approved diversion) and will provide a suitable temporary surface and appropriate barriers to allow the safe crossing of the working area. The parties recognise that limited use of the haul road may be necessary during the event however the project will ensure that such usage will not cause disruption to the event.
OP01	An alternative walking route through West Heath linear park will be signposted using Glebe Road to retain a circular walking route during construction.
OP02	The existing walking and cycling route to the north of the Order Limits from Cabrol Road through Queen Elizabeth Park will be signposted as an alternative to the route within Order Limits.
OP03	Principal pedestrian footpaths within Fordbridge Park crossing the working area would be managed with access only closed for short periods while construction activities occur. Additional signage for diversions on to alternative existing paths will be utilised as appropriate.
OP04	Principal pedestrian routes within SANGs crossing the working area would be managed with access only closed for short periods while construction activities occur. Additional signage for diversions on to alternative existing paths will be utilised as appropriate.
OP05	In recognition that the existing neighbourhood equipped area for play (NEAP) at Queen Elizabeth Park would be impacted by the pipeline construction, the project would reinstate the existing NEAP as soon as practicable after construction (G94). The project will provide an alternative NEAP for use while the existing NEAP is out of commission. The alternative NEAP would either be provided by the project within the Order Limits in the vicinity of the existing NEAP on land belonging to Rushmoor Borough Council or would be provided in collaboration with Rushmoor Borough Council in accordance with the details agreed.
OP07	In recognition that the existing local equipped area for play (LEAP) at Woodthorpe Road would be impacted by the pipeline construction, the project would reinstate the existing LEAP as soon as practicable after construction. The project would seek to provide an alternative LEAP for use while the existing LEAP is out of commission. The alternative LEAP would either be provided by the project within the Order Limits in the vicinity of the existing LEAP on land belonging to Spelthorne Borough Council or would be provided in collaboration with Spelthorne Borough Council in accordance with the details agreed.

4.10 Major Accidents Good Practice Measures

4.10.1 The Major Accidents chapter draws upon the baselines created from other chapters within the ES and consequently good practice measures contained within them. A risk-based assessment was then carried out. The design evolution has removed many of the high-risk areas by avoiding where practicable sensitive receptors such as settlements, ecological sites, cultural heritage sites and sensitive water features. Table 4.8 contains the good practice measure particularly relevant to Major Accidents.

Table 4.8: Major Accidents Good Practice Measures

Ref	Good Practice Measure
G195	Stored flammable liquids such as diesel would be protected either by double walled tanks or stored in a bunded area with a capacity of 110% of the maximum stored volume. Spill kits would be located nearby.

4.11 Cumulative Effects Good Practice Measures

4.11.1 The Cumulative intra-project effects assessment used information from the ES topic chapters to identify where sensitive receptors or groups of receptors could be subject to multiple effects. For the inter-project effects assessment, data on other proposed projects within a 1km study area from the Order Limits were obtained through planning sites and online information.

4.11.2 Cumulative Effects does not have any topic specific good practice measures but draws upon the good practice measures from the other topics in Tables 4.2 to 4.8.

Annex A – Areas of Reduced Working Widths

1.1.1 Table A1 contains the schedule of reduced working widths (narrow working) that would be implemented by the project. This is where the working width is reduced within the Order Limits to reduce impacts to sensitive environmental or community features. The alignment could be anywhere within the LoD and the Order Limits except where specified otherwise.

1.1.2 The grid references in Table A1 below show the start and end points for the narrow working areas and these are also shown on the General Arrangement Plans. Because the narrow working width could be located anywhere within the Order Limits it is difficult to visually represent the lateral extent of narrow working on the General Arrangement Plans. Therefore the narrow working width is shown in an illustrative preferred location based upon a provisional pipeline alignment. Please note however that the location of this narrow working width could be located elsewhere and the definitive criteria for narrow working are set out in the table below and the location shown in General Arrangement Plans is illustrative based on current information only.

Table A1: Reduced Working Width and Narrow Working Techniques (references are as shown in the General Arrangement Plans together with an illustrative preferred location (application document 2.6))

Ref	GA Plan	Location	Reduced Working Measure and Reason
NW1	Sheet 2	Durley	Working width reduced to 15m and positioned towards the eastern half of the Order Limits to reduce impacts on purple moor grass and rush pasture Priority Habitat and to protect a line of trees which are of high value. Also use of ground protection. The approximate distance would be 150m. (Grid ref: SU52246 16257 to SU52314 16384). Turf would be stripped, stored and reinstated above the trench for a distance of 35m between approximate grid references SU 52306 16340 to SU 52329 16365.
NW2	Sheet 17	Four Marks Golf Course	Working width reduced to 10m to reduce impacts on the Golf Course over an approximate distance of 160m (Grid ref: SU 68414 133962 to SU 68543 34062)
NW3	Sheet 18	Farringdon	Working width reduced to 10m to reduce impacts on Priority Habitat and visual impacts for users of public rights of way over an approximate distance of 53m. (Grid ref: SU70092 35638 to SU70132 35673)
NW4 and NW5	Sheet 27	North of Froyle	Working width reduced to 15m to reduce impacts on woodland and landscape within two areas with a combined approximate distance of 100m. (Grid ref: SU78499 46112 to SU78530 46153 and SU7854 846176 to SU78578 46217)
NW6	Sheet 27	Dippenhall Road	Working width reduced to 15m to reduce impacts on Priority Habitat woodland with bat roost potential over an approximate distance of 55m (Grid ref:SU78768 46475 to SU78798 46520)
NW7	Sheet 28 and 29	Oak Park, Crondall	Working width reduced to 15m to reduce impacts on woodland blocks within Oak Park Golf Course, some with bat roost potential and connection to Ancient Woodland. The approximate distance would be 305m. (Grid ref: SU80385 48477 to SU80532 48738)

Ref	GA Plan	Location	Reduced Working Measure and Reason
NW8	Sheet 30	Naishes Lane	Working width reduced to 15m to reduce impacts on Ewshot Meadows SINC and Suitable Alternative Natural Greenspace (SANG) over an approximate distance of 356m. (Grid ref: SU81369 50606 to SU81529 50923)
NW9	Sheet 30, 101 and 102	South of Sandy Lane	Working width reduced to 15m to reduce impacts on TPOs within Wakefords Copse SINC over an approximate distance of 274m. (Grid ref: SU81779 51385 to SU82014 51476)
NW10	Sheet 31	Church Crookham Football Field	Working width reduced to 15m to reduce impacts on the football pitches at Peter Driver Sports Ground over an approximate distance of 190m. (Grid ref: SU8199551755 to SU8218751789)
NW11 and NW13	Sheet 31 and 32	Bourley and Long Valley SPA/SSSI	Working width reduced to 15m to limit impacts on trees and potential bat roosts within Bourley and Long Valley SSSI. Working specifications as detailed within Annex B of the HRA. This consists of two areas with an approximate combined a distance of 293m. (Grid refs: SU82401 52247 to SU82449 52310, and SU83073 53223 to SU83200 53396)
NW12	Sheet 31	Bourley and Long Valley SPA/SSSI	Working width reduced to 15m and positioned towards the western half of the Order Limits to reduce impacts to a recorded spring over an approximate distance of 47m. (Grid ref: SU82685 52667 to SU82693 52711)
NW14	Sheet 32	Basingstoke Canal	Working width reduced to 15m to reduce impacts on the Basingstoke Canal Conservation Area over an approximate distance of 135m. (Grid ref: SU83336 53611 to SU83429 53700)
NW15	Sheet 32, 33 and 103	Old Ively Road	Narrow working width reduced to 5m to reduce impacts to woodland along the Old Ively Road, and trees with high and moderate potential for bat roosts. The approximate distance would be 470m. (Grid ref: SU83847 53962 to SU84236 54174)
NW16	Sheet 34, 104 and 105	Cove Brook	Working width reduced to 15m incorporating an existing track to reduce impacts on woodland near to Cove Brook; an area of high amenity and landscape value in an urban area. The area is also within the Cove Valley, Southern Grassland SINC, with a number of trees with moderate bat roost potential. The approximate distance would be 317m. (Grid ref: SU85434 55535 to SU85664 55709)
NW17	Sheet 34, 35 and 106	Queen Elizabeth Park	Working width reduced to 15m (10m for pipe installation and 5m for a stringing out area) to reduce impacts on Queen Elizabeth Park, an area of high amenity, visual screening and landscape value within an urban area. Two trees with bat roost potential are also present in this location. The approximate distance would be 472m. (Grid ref: SU86544 56032 to SU86949 56192)
NW18	Sheet 35, 106 and 107	Farnborough Hill School/ Ship Lane	Working width reduced to 15m to reduce the impact on adjacent trees and the Conservation Area at Farnborough Hill School over an approximate distance of 440m. (Grid ref: SU 87518 56460 to SU 87324 56789)
NW19	Sheet 35, 36, 110 and 112	SC Johnson	Working width reduced to 15m to reduce the impacts to trees within the Surrey Heath TPO zone over an approximate distance of 545m. (Grid ref: SU87898 57319 to SU88317 57426)
NW20	Sheet 36, 37 and 113	Frith Hill	Narrow working width reduced to 15m at Frith Hill to reduce impacts on mature trees, potential bat roosts and an historic embankment. The approximate distance would be 2.2km (Grid ref: SU89055 58008 to SU90944 58779)

Ref	GA Plan	Location	Reduced Working Measure and Reason
NW21	Sheet 38, 39 and 40	Adjacent to the Maultway	Reduced width working to reduce impacts on mature screening trees along Maultway and also reduce impacts to Colony Bog and Bagshot Heath SSSI and potential bat roosts. Working specifications as detailed within Annex B of the HRA (**application document 6.5**). The approximate distance would be 3.8km. (Grid ref: SU90976 58802 to SU92520 61386)
NW22	Sheet 41	Turf Hill	Working width reduced to 15m to reduce impacts to woodland at Turf Hill over an approximate distance of 888m. (Grid ref: SU93051 61494 to SU93775 61660)
NW23 and 24	Sheet 43 and 44	Chobham Common SPA/ SSSI/ NNR	Working width reduced to 20m along and adjacent to the existing track to reduce impacts on Chobham Common SSSI/NNR. This heathland is protected for several species of reptile including the rare sand lizard. Working specifications are detailed within Annex B of the HRA (**application document 6.5**). This would consist of two areas over a combined distance of 1.6km. (Grid ref: SU96916 63545 to SU97766 64071 and SU98260 64307 to SU98781 64515)
NW25	Sheet 44	North-northeast of Chobham Common	Working width reduced to 15m to reduce impacts on large pine trees within Monk's Walk Site of Nature Conservation Interest (SNCI) which provide significant screening for the Longcross Estate. Potential bat roosts also present. The approximate distance would be 190m. (Grid ref: SU99035 64666 to SU99139 64823)
NW26	Sheet 45 and 46	Foxhill Golf Course	Working width reduced to 15m to reduce impacts on golf course and TPO trees, over an approximate distance of 2020m (Grid ref: 00102 65181 to TQ 01942 65251)
NW27	Sheet 48 and 116	Abbey Moor Golf Course	Working width reduced to 15m to reduce impacts on golf course over an approximate distance of 430m (Grid ref: TQ 04263 65732 to TQ 04672 65618)
NW28	Sheet 48, 49 and 116	Abbey Rangers FC	Working width reduced to 15m (NW28) to reduce impacts on the football pitches at Abbey Rangers Football Club over an approximate distance of 500m. (Grid ref: TQ0496265815 to TQ0526166064).
NW29	Sheet 49 and 117	Chertsey Meads Local Nature Reserve	Working width reduced to 15m and use of ground protection to reduce impacts to Chertsey Meads Local Nature Reserve. The approximate distance would be 720m. (Grid ref: TQ05626 66084 to TQ05972 66563). Turf would be stripped, stored and reinstated above the trench for an approximate distance of 125m between approximate grid references TQ 05958 66596 to TQ 05997 66480. This section would be positioned towards the western half of the Order Limits to protect lowland meadows priority habitat.
NW30	Sheet 52 and 120	Fordbridge Park	Narrow working width reduced to 10m to avoid (where possible) or limit the impacts on memorial trees at Fordbridge Park. The approximate distance would be 409m. (Grid ref: TQ06206 70826 to TQ05889 71060)
NW31	Sheet 52	St James School	Working width reduced to 15m to reduce impact on school grounds and sports fields, further reducing in a small section to 5m wide to utilise an existing track near the Chapel. The approximate distance would be 580m (Grid ref: TQ 06619 72039 to TQ 06650 72473)
NW32	Sheet 29	Ewshot	Working width reduced to 10m to reduce impact on trees over an approximate distance of 90m. (Grid ref: SU 80938 50206 to SU 81011 50261)
NW33	Sheet 29	Ewshot Hill	Narrow working techniques to reduce impacts to Ancient Woodland and potential ancient woodland at Ewshot Hill. Haul road and pipe installation to utilise an existing gap between two areas of ancient woodland above a culvert. The approximate distance would be 10m (Grid ref: SU 80611 49673).

Annex B – Schedule of Trenchless Crossings

1.1.1 Table B1 contains the schedule of trenchless crossings that would be implemented by the project.

Table B1: Schedule of Trenchless Crossings (references are as shown in the General Arrangement Plans (application document 2.6) and to be certified as part of the DCO)

Ref	GA Plan	Location	Trenchless Technique	Justification
TC001	Sheet 1	Ford Lake Stream	Horizontal directional drilling (HDD) trenchless technique over approximately 253m.	A trenchless crossing would be used to minimise disruption to the stream and its habitats.
TC002	Sheet 6	Stakes Lane	Auger bore trenchless technique over approximately 35m.	A trenchless crossing is proposed under this rural road to avoid traffic disruptions, based on feedback from the Hampshire Highway Authority.
TC004	Sheet 11	A272	HDD trenchless technique over approximately 121m.	A trenchless crossing would be used to avoid the need to close this main road between Bramdean and Petersfield.
TC005	Sheet 15	Petersfield Road	Auger bore trenchless technique over approximately 35m.	A trenchless crossing would be used under this rural road to avoid traffic disruptions, based on feedback from the Hampshire Highway Authority.
TC006	Sheet 19	A32	HDD trenchless technique over approximately 162m.	A trenchless crossing would be used as this is a main road into Chawton and Alton.
TC007	Sheet 21	Caker Lane	Either Open Cut or auger bore trenchless technique over approximately 28m.	The crossing of Caker Lane may be trenchless or Open Cut. This is still to be determined.
TC008	Sheet 23	River Wey and Alton to Waterloo railway line	HDD trenchless technique over approximately 209m.	Two trenchless crossings would be used to pass under the River Wey and Alton to Waterloo railway line, and then the A31 Alton Bypass. This would mean that people can still use the major road out of Alton and the railway during installation. The crossing under the River Wey would protect the river from the potential disturbance that could result from Open Cut trench installation.
TC009	Sheet 23	A31 and minor access road	HDD trenchless technique over approximately 163m.	
TC010	Sheet 29	A287 Ewshot Hill	HDD trenchless technique over approximately 185m.	A trenchless crossing would be used to avoid disruption to the A287, which is a major route into Farnham.

Ref	GA Plan	Location	Trenchless Technique	Justification
TC011	Sheet 31	Bourley and Long Valley SSSI	HDD trenchless technique over approximately 309m.	Two consecutive trenchless crossings would be used to avoid wetland areas in this SSSI.
TC 012	Sheet 32	Bourley and Long Valley SSSI	HDD trenchless technique over approximately 252m.	
TC013	Sheet 32	Basingstoke Canal SSSI and A323	HDD trenchless technique over approximately 198m.	A trenchless crossing would be used to avoid disruption of the A323 between Fleet and Aldershot and takes account of the SSSI and Conservation Area designations.
TC014	Sheet 33	A327 Ively Road	Auger bore trenchless technique over approximately 32m.	A trenchless crossing would be used to avoid the A327, which is a major route into Farnborough and to avoid disruption to local residents.
TC014a	Sheet 34	Cove Brook Flood Storage Area	Auger bore trenchless technique over approximately 30m.	Following a request from the Environment Agency, a trenchless crossing would be used to address the EA's concerns regarding the dam at the Cove Brook Flood Storage Area
TC015	Sheet 34	South Western Main railway line	Auger bore trenchless technique over approximately 43m.	A trenchless crossing of the South Western Main railway line would reduce impacts on rail travel.
TC016	Sheet 34	Cove Brook	HDD trenchless technique over approximately 85m.	A trenchless crossing would be used along the northern side of the South Western Main railway line to avoid the Cove Brook watercourse.
TC017	Sheet 34	North side of railway embankment	HDD trenchless technique over approximately 294m.	Two consecutive trenchless crossings are proposed on the north side of the South Western Main railway line, parallel to West Heath Road and adjacent to the railway embankment. The first crossing would reduce disruption to back gardens and the second crossing would reduce disruption on Stake Lane and avoid disruption on Prospect Road.
TC018	Sheet 34	Parallel to West Heath adjacent Railway Embankment Northside	HDD trenchless technique over approximately 443m.	
TC019	Sheet 35	A325 Farnborough Road	Auger bore trenchless technique over approximately 51m.	A trenchless crossing would be used to avoid the A325, which is a major route through Farnborough.

Ref	GA Plan	Location	Trenchless Technique	Justification
TC020	Sheet 35	Blackwater Valley	Open Cut and auger bore or HDD trenchless technique over approximately 433m.	A trenchless crossing would be used to go under the North Downs railway line, the A331, River Blackwater, and Ascot to Guildford railway line. This would reduce impacts on travel for local people and minimise disturbance to the wildlife in the River Blackwater. The crossing of the remaining elements of the Blackwater Valley may be trenchless or Open Cut. This is still to be determined.
TC021	Sheet 41	A322 Lightwater Bypass	Auger bore trenchless technique over approximately 58m.	A trenchless crossing would be used to avoid the A322 Lightwater Bypass and reduce impacts on travel in the local area.
TC022	Sheet 41	Hale Bourne	HDD trenchless technique over approximately 33m.	A trenchless crossing would be used to minimise impacts on the ecology of the watercourse.
TC023	Sheet 42	Windlesham Road	Open Cut and HDD or auger bore trenchless technique over approximately 67m.	Although this is a minor road, the currently available buried services information suggests that crossing the road using Open Cut techniques may lead to a lengthy road closure. Until trial trenches have been excavated across the road and detailed plotting of a pipe route is done, the option to cross the road using trenchless techniques has been allowed for in the design of the Order Limits.
TC024	Sheet 43	Chobham Common	HDD trenchless technique over approximately 237m.	Three trenchless crossings are proposed in Chobham Common to cross areas of wetland.
TC025	Sheet 44	Chobham Common	HDD trenchless technique over approximately 232m.	
TC026	Sheet 44	Chobham Common	HDD trenchless technique over approximately 271m.	
TC027	Sheet 45	Accommodation Road	HDD trenchless technique over approximately 168m.	A trenchless crossing would be used to minimise disruption on this busy road.
TC028	Sheet 46	Holloway Hill woods	HDD trenchless technique over approximately 464m.	A trenchless crossing would be used when passing through Holloway Hill woods to reduce the need to cut down mature trees or damage roots. This trenchless crossing would also

Ref	GA Plan	Location	Trenchless Technique	Justification
				traverse under the strip of possible ancient woodland along the south verge of Longcross Road (B386) in Foxhills Golf Club.
TC029	Sheet 47	Hardwick Lane	HDD trenchless technique over approximately 177m.	A trenchless crossing would be used to minimise disruption on this road as well as traversing under trees which are subject to tree preservation orders.
TC030	Sheet 48	A320 Guildford Road, Salesian School grounds and M25	HDD trenchless technique over approximately 317m.	A trenchless crossing would be used to avoid impacts on the A320, which is a major road into Chertsey, and the school. A trenchless crossing of the M25 would be used to ensure that one of the UK's busiest motorways can remain open throughout installation.
TC031	Sheet 48	Chertsey Branch railway line	Auger bore trenchless technique over approximately 71m.	A trenchless crossing would be used to avoid the Chertsey Branch railway line, reducing impacts on travel in the area.
TC032	Sheet 48	A317 Chertsey Road	Auger bore or HDD trenchless technique over approximately 300m.	A trenchless crossing would be used to reduce impacts on traffic in the built-up area of Chertsey and to reduce impacts on the FA standard pitch at Abbey Rangers FC.
TC033	Sheet 49	Chertsey Bourne	HDD trenchless technique over approximately 62m.	A trenchless crossing would be used to minimise impacts on the ecology of the watercourse.
TC034	Sheet 49	River Thames and B375 Chertsey Bridge Road	HDD trenchless technique over approximately 350m.	A trenchless crossing under the River Thames would mitigate impacts on river habitats and people travelling by boat. The B375 is a busy road between Chertsey and Walton-on-Thames, and the use of a trenchless technique would avoid disruption to travel in the area.
TC035	Sheet 49	M3	HDD trenchless technique over approximately 122m.	A trenchless crossing would be used to pass under the M3. This technique would mean that this major UK motorway can remain open throughout installation.
TC036	Sheet 50	B376 Shepperton Road	Auger bore trenchless technique over approximately 54m.	A trenchless crossing would be used to go under the B376 Shepperton Road, avoiding disruption to this road.

Ref	GA Plan	Location	Trenchless Technique	Justification
TC037	Sheet 51	Queen Mary Reservoir Intake Canal	Auger bore trenchless technique over approximately 44m.	A trenchless crossing would be used to minimise obstruction to the canal and the habitats within it.
TC038	Sheet 51	Staines Reservoir Aqueduct and B377 Ashford Road	HDD trenchless technique over approximately 137m.	A trenchless crossing would be used to pass under the aqueduct avoiding disruption to a strategic watercourse and the B377.
TC039	Sheet 52	Staines Bypass A308, River Ash and Woodthorpe Road	HDD trenchless technique over approximately 204m.	A trenchless crossing would be used to go under the Staines Bypass, the River Ash and Woodthorpe Road from Fordbridge Park, avoiding disruption to these busy roads.
TC040	Sheet 52	B378 Church Road	Auger bore trenchless technique over approximately 41m.	A trenchless crossing would be used to go under the B378, avoiding disruption to the travelling public around Ashford Station.
TC041	Sheet 52	Waterloo to Reading Railway Line	Auger bore trenchless technique over approximately 75m.	A trenchless crossing would be used to avoid disruption to the rail services in the area.
TC042	Sheet 53	Staines Road A30	HDD or auger bore trenchless technique over approximately 66m.	A trenchless crossing would be used under Staines Road to avoid travel disruption in the area.