

Southampton to London Pipeline Project

Volume 6

Environmental Statement (Volume B)
Chapter 7: Biodiversity

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7 Biodiversity

7.1 Introduction

- 7.1.1 This chapter on biodiversity considers habitats and species in both freshwater and terrestrial environments. This assessment has been undertaken with reference to guidance provided in the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 3rd edition* (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018) (hereafter referred to as ‘the CIEEM Guidelines’). In this assessment, the term ‘ecological receptor’ will be used in preference to ‘ecological feature’ as is used in the CIEEM Guidelines. This is to provide consistency between different discipline chapters.
- 7.1.2 The project uses reference codes and numbers to enable the identification of specific features along the route, such as hedgerows, trees, Ancient Woodland and watercourses. Reference codes and numbers are also used to identify specific road (RCX), hedgerow (HCX) and watercourse (WCX) crossings, as well as the locations of trenchless construction techniques (TC). Every good practice measure also has its own reference number (e.g. G1, HRA1). These references are referred to throughout this chapter, as necessary. There are also NW references which relate to the locations where reduced working width would apply.

Legislative and Policy Background

- 7.1.3 Legislation applicable to biodiversity is broadly split into two key types: strict protection of sites or species; and duties on all public bodies, including local authorities, National Park Authorities and Natural England. Chapter 2 Regulatory and Policy Context supported by Appendix 2.1 Environmental Legislation and Policy summarises the relevant legislation.
- 7.1.4 Chapter 2 Regulatory and Policy Context sets out the overarching policy relevant to the project including the Overarching National Policy Statement for Energy (EN-1). EN-1 contains the following paragraph relating to biodiversity which has been considered within this chapter. Paragraph 5.3.3 states:

‘Where the development is subject to [Environmental Impact Assessment] EIA the applicant should ensure that the [Environmental Statement] ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.’

- 7.1.5 In addition, Appendix 2.1 Environmental Legislation and Policy includes legislation and national policy relevant to biodiversity. Appendix 2.2 Regional and Local Planning Policy provides a review of local policies considered in the project including those relevant to biodiversity.



7.2 Approach and Methods

- 7.2.1 The methodology to assess the impact on ecological receptors used in this report follows the CIEEM Guidelines (CIEEM, 2018). The following are described in this section:
- methodology used to determine the scope of the assessment;
 - methodology used to determine the baseline conditions pertinent to the assessment;
 - matters scoped out of the assessment;
 - matters scoped in to the assessment;
 - methodology used to determine the significance of impacts;
 - consultee engagement that has informed the assessment; and
 - limitations of the assessment.
- 7.2.2 The scope of the assessment has been informed by the Scoping Opinion, provided by the Planning Inspectorate in September 2018, on behalf of the Secretary of State, following the submission of the Scoping Report (Esso, 2018). The scope has also been informed through engagement with relevant consultees including Natural England.

Scope of Assessment

Geographical Scope – Study Area

- 7.2.3 The route and Order Limits are broken down into eight separate Sections (Section A to Section H), further details can be found in Chapter 3 Project Description:
- Section A – Boorley Green to Bramdean;
 - Section B – Bramdean to South of Alton;
 - Section C – South of Alton to Crondall;
 - Section D – Crondall to Farnborough;
 - Section E – Farnborough to Bisley and Pirbright Ranges;
 - Section F – Bisley and Pirbright Ranges to M25;
 - Section G – M25 to M3; and
 - Section H – M3 to the West London Terminal storage facility.
- 7.2.4 It is considered that pipeline installation typically produces temporary and localised impacts. To reflect this, a desk study involving the collection of existing records within a minimum 1km radius from the Order Limits. The study area was extended for some species. The desk study was initially based on the pipeline corridor options in early 2018 and then the preferred corridor, until the route (with associated Order Limits) was defined (see Chapter 4 Design Evolution).
- 7.2.5 The geographical extent of the desk study was modified accordingly for specific receptors e.g. statutory designated sites downstream of watercourse crossings that



are potentially sensitive to hydrological change, or statutory designated sites notable for the presence of mobile species that may use habitats within the Order Limits. These are shown in Table 7.2.

- 7.2.6 The results of the desk study have informed the requirement for field surveys. The survey area for each receptor (see Table 7.2) has been defined by professional judgement (e.g. based on the habitat preferences of the target species and the presence of barriers to movement), consultation and engagement responses, appropriate good practice guidelines, and the extent of the project's anticipated zones of influence.

Temporal Scope

- 7.2.7 The temporal scope of this assessment comprises the construction and operational stages of the proposed replacement pipeline. The project's programme can be found in Appendix 3.2 Proposed Construction Schedule.
- 7.2.8 The construction schedule has yet to be developed in detail, as this would be undertaken during the detailed design stage. For the purposes of assessment, a short-term duration is assumed to be less than six months based on the criteria set out in Chapter 3 Project Description and includes mobilisation and reinstatement
- 7.2.9 The collection of baseline information was predominantly undertaken in 2018, although some additional survey work was completed in 2019. This is detailed in the appendices to this chapter.

Technical Scope

- 7.2.10 The CIEEM Guidelines recommend that the technical scope of the assessment should comprise those ecological receptors that as a minimum meet the following criteria:
- be of sufficient value such that effects upon them may be significant; and
 - be potentially vulnerable to significant effects arising from the development.
- 7.2.11 The source-pathway-receptor approach was followed to understand the mechanisms by which the project could result in potential significant effects on ecological receptors. Potential sources of significant effects were identified, the zone of influence was defined, and the pathway recorded. For a significant effect to occur, all three elements of the concept must be in place. The absence or removal of one of the elements means there is no likelihood for the significant effect to occur.
- 7.2.12 The pathways to potential significant effects and source activities considered in this assessment are summarised in Table 7.1.
- 7.2.13 A specific assessment relating to potential significant effects to European designated wildlife sites is provided in the project's Habitats Regulations Assessment Report (**application document 6.5**).



Table 7.1: Summary of Pathways to Potential Significant Effects

Pathway	Source Activity	Zone of Influence
Construction phase		
Mortality and injury of species	Soil and vegetation clearance, removal of above ground features, in-channel (watercourse) working, and installation of boundaries/fences	Physical interaction between species and project infrastructure, machinery or activities would be limited to areas within the Order Limits only.
Habitat loss/gain, fragmentation or modification	Soil and vegetation clearance, removal of above ground features, in-channel (watercourse) working, and installation of boundaries/fences	Habitat loss/gain would be restricted to areas cleared to make way for pipeline installation, temporary compounds, logistics hubs or temporary access roads. This would include the removal of soils as well as surface vegetation. Retained habitats to either side of the Order Limits may be temporarily fragmented between the period when vegetation/topsoil clearance works start and habitat reinstatement is completed. Habitat modification might arise due to air quality changes or changes in water quantity or quality within the zones of influence described below.
Contamination of surface waterbodies	Excavation and construction activities causing release of sediment or other pollutants	Aquatic habitats (watercourses, ponds, ditches) with a hydrological connection to the project.
Changes to groundwater quality and quantity	Excavation and construction activities in or near Groundwater Dependent Terrestrial Ecosystems (GWDTE)	GWDTE with hydrological connectivity to the project (in and outside of the Order Limits).
Species disturbance	Construction noise, vibration, visual and light stimuli	The area subject to noise and vibration disturbance varies based on the activity being undertaken and the sensitivity of the individual receptor. All potentially sensitive receptors within the area likely to be exposed to noise level changes have been considered. Consideration has been given to the effects of visual disturbance for all potentially sensitive receptors. The zone of influence for visual disturbance is not possible to quantify and varies with each receptor and type of stimuli. Professional judgement has been used to determine appropriate receptor-specific zones of influence, as necessary.
Air quality changes – habitat loss/modification	Dust created by construction works	50m from the Order Limits (IAQM, 2014).
Introduction and/or spread of Invasive Non-Native Species (INNS)	Site and vegetation clearance, soil stripping, machinery movements and habitat reinstatement	All areas within the Order Limits in work sections supporting INNS. This extends to 7m beyond the Order Limits if Japanese knotweed (<i>Fallopia japonica</i>) is present. Downstream of watercourses directly or indirectly affected by the project in work sections supporting INNS (up to 1km).
Operation phase		
Species disturbance	Operational lighting, noise and vibration at the Boorley	The area subject to noise and vibration disturbance varies based on the activity being undertaken and the sensitivity of the individual receptor. All potentially



Pathway	Source Activity	Zone of Influence
	Green Pigging Station and Alton Pumping Station.	sensitive receptors within the area likely to be exposed to noise or lighting level changes at Alton Pumping Station and the proposed Boorley Green Pigging Station have been considered. The zone of influence for visual disturbance is extremely difficult to quantify and varies with each receptor and type of stimuli. Professional judgement has been used to determine appropriate receptor-specific zones of influence, as necessary.
Changes to groundwater quality and quantity	Presence of new sub-surface infrastructure	GWDTE with hydrological connectivity to the project (in and outside of the Order Limits) which could be sensitive to changes in groundwater quality and quantity e.g. flows modified by new impermeable sub-surface infrastructure (i.e. the pipeline acts as a barrier) or fill material around the new pipe acts as a conduit drawing flow away.

Baseline Conditions

- 7.2.14 Baseline conditions were established using a combination of desk study and field surveys. The baseline was collected to meet the requirements of a number of different assessments:
- assessment of the potential significant effects on ecological receptors;
 - compliance with legislation relating to species protection; and
 - compliance with legislation relating to European designated wildlife sites.
- 7.2.15 A summary of the work undertaken and the methodologies used to establish the baseline for the assessment is provided in Table 7.2. This table details all the biodiversity receptors reviewed or surveyed.
- 7.2.16 As explained above, the study area for all data requests extended 1km beyond the Order Limits, to give context of the surrounding areas. The desk study data reported here comprise areas within 1km of the Order Limits.
- 7.2.17 Only those biodiversity receptors where potential significant effects were identified in the scoping process are described in the baseline (section 7.3). Full details on the various studies and surveys undertaken can be found within the appendices to this chapter.



Table 7.2: Summary of Ecological Information and Surveys Completed to Establish the Baseline

Ecological Receptor	Study/Survey Type	Study/Survey Area	Date(s)	Appendix Reference	Adapted Methodology
Desk study summary					
Statutory designated wildlife sites	Desk study using data from: <ul style="list-style-type: none"> • Joint Nature Conservation Committee (JNCC); • Natural England; • 2Js Ecology (2Js Ecology, 2018); and • Environment Agency (Environment Agency, 2018). 	Within 1km of the Order Limits, extended to encompass sites with hydrological connectivity to the project and extended to 10km for European sites with bats as designated features.	2018	n/a – see Baseline (section 7.3)	Professional judgement based on good practice and consideration of potential ecological receptors present.
Non-statutory designated wildlife sites, habitats and notable or controlled species (plants and animals)	Desk study information obtained from: <ul style="list-style-type: none"> • Hampshire Biodiversity Information Centre (HBIC); • Surrey Biodiversity Information Centre (SBIC) (information received for non-statutory wildlife sites only); • Greenspace Information for Greater London (GiGL); • Hampshire Bat Group; • Surrey Bat Group; • Surrey Amphibian and Reptile Group (SARG); • West Surrey Badger Group; • Environment Agency; • Chertsey angling reports; • Thames Angler’s Conservancy; • Basingstoke Canal Angling Association; • MAGIC website for locations of European Protected Species (EPS) licences, Priority Habitats and Ancient Woodland Inventory sites (MAGIC, 2018); and • relevant web-based sources. 	Within 1km of the Order Limits. Aquatic species and bat species data – search area extended to 2km and 5km of the Order Limits, respectively, to identify highly mobile, migratory species.	February – November 2018	Baseline (section 7.3) and Appendices 7.1 – 7.12	



Ecological Receptor	Study/Survey Type	Study/Survey Area	Date(s)	Appendix Reference	Adapted Methodology
Habitat and botanical surveys					
Terrestrial habitats	Desk study: <ul style="list-style-type: none"> biological record centre data request (sources listed above) 	Within 1km of the Order Limits	February – April 2018	Appendix 7.1 – Habitats and Botany Factual Report	Professional judgement based on Phase 1 Habitat survey methodology (JNCC, 2010) and National Vegetation Classification methods (Rodwell, 2006).
	Field surveys: <ul style="list-style-type: none"> Phase 1 habitat; and National Vegetation Classification (NVC) vegetation survey. 	All sites identified in the desk study as potentially of importance for biodiversity, in relation to habitats.	May - November 2018		
Aquatic habitats	Field survey: <ul style="list-style-type: none"> walkover survey to identify key aquatic habitat types that could be sensitive to development and construction. 	Watercourses crossed by the Order Limits and groundwater dependent terrestrial ecosystems (GWDTE) with hydrological connectivity to the Order Limits.	July 2018	Appendix 7.5 – Aquatic Ecology Factual Report	Professional judgement based on the potential impacts of construction methods used at each location (e.g. trenchless crossings or horizontal directional drilling).
Ancient Woodland	Desk study: <ul style="list-style-type: none"> Ancient Woodland listed on the national inventory for Ancient Woodland (Forestry Commission, 2018); and Potential Ancient Woodland Sites (less than 2ha) - woodland sites less than 2ha in area that are not on the national inventory but where a desk study suggests these may have an ancient status (see Appendix 7.3 for methodology). 	Within 1km of the Order Limits for Ancient Woodland Inventory sites. Within 50m of the Order Limits for Potential Ancient Woodland Sites (less than 2ha).	October 2018	Appendix 7.3 – Ancient Woodland Factual Report	Professional judgement based on good practice and consideration of the potential impacts of construction activity.
Hedgerows	Desk study: <ul style="list-style-type: none"> Stage one: hedgerow review to identify hedgerows crossed by the Order Limits. Stage two: hedgerow review to assess which identified hedgerows are or could be 'important' under the Hedgerows Regulations 1997, based on available information. 	Hedgerows crossed by the Order Limits.	October 2018	Appendix 7.2 – Hedgerow Factual Report	Professional judgement



Ecological Receptor	Study/Survey Type	Study/Survey Area	Date(s)	Appendix Reference	Adapted Methodology
	Field survey: <ul style="list-style-type: none"> hedgerow survey 	Hedgerows identified during the desk study crossed by the Order Limits and where it could not be determined whether they would be 'important' under the Hedgerows Regulations 1997.	October - November 2018		<i>Hedgerow Survey Handbook</i> (DEFRA, 2007)
Plants	Desk study: <ul style="list-style-type: none"> biological record centre data request (sources listed above) 	Within 250m of the Order Limits	February – April 2018	Appendix 7.1 – Habitats and Botany Factual Report	Professional judgement and consideration of the potential impacts of construction at specific locations.
	Field survey: <ul style="list-style-type: none"> detailed botanical survey to record lower and higher plants and identify populations of notable plants. 	Sites of botanical interest identified in desk study within 50m of the Order Limits	May – November 2018	Appendix 7.1 – Habitats and Botany Factual Report	
INNS	Desk study: <ul style="list-style-type: none"> biological record centre data (sources listed above); INNS recorded during habitats and botany surveys; incidental records; and identification of 'high risk' areas, using results from botanical surveys and incidental ecology records. 	Records of INNS were requested within 1km of the Order Limits. Areas within the Order Limits with increased risk of becoming contaminated by the spread/transfer of invasive species were identified.	January – November 2018	Appendix 7.4 – Invasive Non-Native Species Factual Report	Incidental records of INNS were recorded by ecologists during field surveys.
Species surveys					
Badger (<i>Meles meles</i>)	Desk study - habitat suitability assessment using: <ul style="list-style-type: none"> publicly available Ordnance Survey (OS) maps and aerial imagery; pecially commissioned high-resolution aerial photography and LiDAR information; Phase 1 habitat survey results (Figure 7.4); and biological record centre data (sources listed above) 	Within 1km of the Order Limits.	April 2018 – February 2019	Appendix 7.6 – Badger Factual Report	Natural England (2011)



Ecological Receptor	Study/Survey Type	Study/Survey Area	Date(s)	Appendix Reference	Adapted Methodology
	Field survey: <ul style="list-style-type: none"> presence/absence of badger; and classification of sett type and activity status 	Within 30m of the Order Limits – in selected areas identified by a desk study as being potentially suitable for badger setts	July 2018 – February 2019		Incidental records of badger were recorded by ecologists during field surveys.
Bats	Desk based habitat suitability assessment and valuation using: <ul style="list-style-type: none"> publicly available OS maps and aerial imagery; specially commissioned high-resolution aerial photography and LiDAR information; Phase 1 habitat survey results (Figure 7.4); and statutory designated sites and European Protected Species (EPS) licences in relation to bats (sources listed above); biological record centre data (sources listed above); and habitat and bat roost data collated in the field 	Up to 1km from the Order Limits	April 2018 – February 2019	Appendix 7.7 – Bat Factual Report	<i>Bat Surveys for Professional Ecologists – Good Practice Guidelines 3rd edition</i> (Collins, 2016); BSI (2015); Andrews (2013); Wray <i>et al.</i> (2010); Bat Tree Habitat Key (2018); and Professional judgement based on the potential impacts of construction activity in each location.
	Field surveys: <ul style="list-style-type: none"> preliminary ground level roost assessment of trees and structures; aerial inspections of trees identified as having moderate or high bat roost potential to further determine roost suitability; and dusk emergence / dawn re-entry surveys of selected trees with high or moderate bat roosting potential that were unsafe to climb for an aerial inspection 	Within 10m of the Order Limits	February 2018 – February 2019		
			July – October 2018		
Birds	Desk study compiled from: <ul style="list-style-type: none"> biological record centre data (sources listed above); Phase 1 habitat survey results (Figure 7.4); and 	Records within 1km of the Order Limits	January 2018	Appendix 7.8 – Bird Factual Report	N/A



Ecological Receptor	Study/Survey Type	Study/Survey Area	Date(s)	Appendix Reference	Adapted Methodology
	<ul style="list-style-type: none"> Annex I bird records for the Thames Basin Heaths SPA (2Js Ecology, 2018) 				
Dormouse (<i>Muscardinus avellanarius</i>)	Desk study - Habitat suitability assessment and valuation comprising: <ul style="list-style-type: none"> publicly available OS maps and aerial imagery; specially commissioned high-resolution aerial photography and LiDAR information; Phase 1 habitat survey results (Figure 7.4); EPS licences in relation to dormice (sources listed above); and biological record centre data (sources listed above). 	Within 1km of the Order Limits	January – June 2018	Appendix 7.9 – Dormouse Factual Report	Natural England (2015) <i>The Dormouse Conservation Handbook</i> (2nd Ed) (Bright <i>et al.</i> , 2006)
	Field survey: <ul style="list-style-type: none"> habitat suitability assessment; and presence/absence (nest tube survey and nut search). 	Selected areas identified as potentially suitable for dormouse by desk study and where existing records of dormouse were not identified	June – November 2018		Incidental records of dormouse-chewed nuts were recorded by ecologists during field surveys.
Fish	Field survey – environmental DNA (eDNA)	Four sites where open trench construction across watercourses is proposed and where walkover survey was unable to conclusively provide a habitat sensitivity judgement and Environment Agency data, were absent.	July 2018	Appendix 7.5 – Aquatic Ecology Factual Report	Survey protocol for eDNA (NatureMetrics, 2018).
Great crested newt (<i>Triturus cristatus</i>) (GCN)	Desk study: <ul style="list-style-type: none"> EPS licences in relation to GCN (sources listed above); Phase 1 habitat survey results (Figure 7.4); and biological record centre data (sources listed above). 	Within 1km of the Order Limits	February 2018 – February 2019	Appendix 7.10 Great Crested Newt Factual Report	Professional judgement following good practice guidelines.



Ecological Receptor	Study/Survey Type	Study/Survey Area	Date(s)	Appendix Reference	Adapted Methodology
	Field surveys: <ul style="list-style-type: none"> Habitat Suitability Index (HSI); environmental DNA (eDNA); and presence/absence surveys 	Waterbodies (ponds, lakes and ditches) up to 250m either side of the Order Limits. Selected waterbodies within 250m either side of the Order Limits.	February – March 2018 Mid-April – 30 th June 2018		<i>Advice Note 5: Great Crested Newt Habitat Suitability Index</i> (Amphibian and Reptile Group UK, 2010) Biggs <i>et al.</i> (2014) Natural England (2015) <i>Great Crested Newt Mitigation Guidelines</i> (English Nature, 2001).
Reptiles	Desk study: <ul style="list-style-type: none"> EPS licences in relation to rare reptiles (sources listed above); biological record centre data (sources listed above); Phase 1 habitat survey results (Figure 7.4); and habitat suitability assessment and valuation to identify sites with potential to support reptiles using habitat survey results and aerial imagery. 	Up to 1km from the Order Limits	February – November 2018	Appendix 7.11 – Reptile Factual Report	Froglife (1999) HGBI (1998)



Ecological Receptor	Study/Survey Type	Study/Survey Area	Date(s)	Appendix Reference	Adapted Methodology
	Field survey: <ul style="list-style-type: none"> presence/absence habitat assessment 	Within the Order Limits: <ul style="list-style-type: none"> in selected areas identified as having potential to support 'medium' or 'high' (Herpetofauna Groups of Britain and Ireland (HGBI), 1998) populations of common reptiles; and 'complex' or isolated habitat where habitat management would be an inappropriate mitigation technique. 	August – November 2018		
Riparian mammals (otter (<i>Lutra lutra</i>) and water vole (<i>Arvicola amphibius</i>))	Desk study: <ul style="list-style-type: none"> EPS licences in relation to otter (sources listed above); biological record centre data (sources listed above); Phase 1 habitat survey results (Figure 7.4); and habitat suitability assessment. 	Within 1km of the Order Limits	February – November 2018	Appendix 7.12 – Riparian Mammals Factual Report	<i>Water Vole Conservation Handbook</i> (Strachen <i>et al.</i> , 2011). Chanin (2003). Professional judgement based on good practice guidelines and consideration of the potential impacts of construction activity.
	Field survey: <ul style="list-style-type: none"> habitat assessment presence/absence 	Watercourses crossed by the Order Limits identified as suitable for otter and/or water vole from the desk study for a typical distance of 200m to either side of the Order Limits. Watercourse crossing points scoped in from habitat suitability assessments as being suitable for otter and/or water vole for a typical distance of 200m either side of the Order Limits.	July 2018 – January 2019		



Matters Scoped out of the Assessment

- 7.2.18 Some pathways to potential significant effects and/or ecological receptors were scoped out of the assessment, as detailed in the Scoping Report (Esso, 2018), as they are considered unlikely to lead to significant effects. These matters and the Scoping Opinion received from the Planning Inspectorate are summarised in Table 7.3. This table includes the references (for example ID 4.6.1) to the relevant paragraph response from the Planning Inspectorate in the Scoping Opinion.

Changes in Air Quality Arising from Vehicle Emissions

- 7.2.19 During construction, the anticipated increase in vehicular movements is less than the threshold criteria set for an air quality assessment (see Appendix 13.2 Air Quality Technical Note); as such, changes to air quality were scoped out as no pathway to potential significant effect is anticipated. For the operational phase of the project, no pathways to effects were found relating to changes in air quality.

Suitable Alternative Natural Greenspaces

- 7.2.20 Suitable Alternative Natural Greenspaces (SANGs) are not considered in the biodiversity chapter as they are not biodiversity receptors. Where relevant, these are discussed in the project's Habitats Regulations Assessment Report (**application document 6.5**) with respect to potential impacts of disturbance to European sites due to displaced recreational activity.

Impacts and Receptors Addressed by Design and Good Practice Measures

- 7.2.21 The embedded and good practice measures (as defined in Section 7.4 Design and Good Practice Measures and in Chapter 4 Design Evolution) were considered in the Scoping Report (Esso, 2018) as integral to the project and, as such, could be relied upon to scope out potential impacts or receptors. Those potential impacts or receptors agreed by the Planning Inspectorate to be scoped out are summarised in Table 7.3 and are not considered further in this assessment.
- 7.2.22 The Planning Inspectorate advised that several impacts or receptors should not be scoped out. These have been scoped in and are summarised in Table 7.15 in Section 7.5. Appendix 5.1 Responses to the Scoping Opinion sets out in full the Planning Inspectorate's Scoping Opinion and the project's response to each comment.



Table 7.3: Matters Scoped out of Assessment

Receptor	Matter/Potential impact	Comments from the Planning Inspectorate in the Scoping Opinion (September 2018)
Designated sites		
Statutory designated sites and Non-statutory designated sites	Habitat loss/gain, fragmentation or modification - sites outside of the Order Limits (excluding hydrological impacts) – construction	(ID 4.1.12) With the exception of potential significant effects arising from air quality (including dust) and hydrological changes on designated sites beyond the Order Limits..., the Inspectorate agrees that having had regard to the characteristics of the Proposed Development impacts associated with habitat loss/ gain, fragmentation or modification on these designated sites (excluding air quality and hydrological impacts) is unlikely to result in significant effects.
	Habitat loss/gain, fragmentation or modification – operation	(ID 4.1.3) The Inspectorate agrees that this matter can be scoped out of the impact assessment as significant effects from habitat loss during operation are not likely to occur.
	Species disturbance (from changes to noise, vibration, visual and light stimuli) – operation	(ID 4.1.5) Inspectorate agrees that effects of noise and vibration as a result of the flow of fuel in the pipeline and the operation of valves, can be scoped out of the ES on the basis of low likelihood of significant effects.
	Air quality changes – operation	(ID 4.1.7) The Inspectorate agrees on the basis of the information provided and the characteristics of the operational development that air quality change effects on ecological receptors during operation can be scoped out of the ES.
	Introduction and spread of INNS – operation	(ID 4.1.10) The Inspectorate agrees that during operation there is unlikely to be significant effects associated with the introduction and/or spread of INNS during operation. Accordingly, this matter can be scoped out of the ES.
Habitats and botany		
Ancient Woodland and Priority Habitats	Habitat loss/gain, fragmentation or modification – operation	(ID 4.1.3) The Inspectorate agrees that this matter can be scoped out of the impact assessment as significant effects from habitat loss during operation are not likely to occur.
	Air quality changes – operation	(ID 4.1.7) The Inspectorate agrees on the basis of the information provided and the characteristics of the operational development that air quality change effects on ecological receptors during operation can be scoped out of the ES.
	Introduction and spread of INNS – operation	(ID 4.1.10) The Inspectorate agrees that during operation there is unlikely to be significant effects associated with the introduction and/or spread of INNS during operation. Accordingly, this matter can be scoped out of the ES.
Vascular plants – arable weeds, heathland plants and floodplain plants	Habitat loss/gain, fragmentation or modification – operation	(ID 4.1.3) The Inspectorate agrees that this matter can be scoped out of the impact assessment as significant effects from habitat loss during operation are not likely to occur.



Species		
Badger	Negligible biodiversity value; Mortality and injury – construction and operation; Habitat loss/gain, fragmentation or modification – construction and operation; and Disturbance – construction and operation	(ID 4.1.23) The Inspectorate agrees that effects on badgers can be scoped out of the ES on the basis of their conservation status and the population in the local area.
Bats	Mortality and injury – collision with project plant/vehicles – construction	(ID 4.1.1) On the basis of the low number of machinery/vehicles proposed to be moving through the route at any one time, the Inspectorate agrees that this is unlikely to give rise to significant effects and can be scoped out of the ES. The Inspectorate notes the intention to assess mortality/injury to species during construction arising from other activities.
	Mortality and injury – operation	(ID 4.1.2) The Inspectorate agrees that this potential effect can be scoped out of the impact assessment given the absence of a potential effect pathway.
	Habitat loss/gain, fragmentation or modification – operation	(ID 4.1.3) The Inspectorate agrees that this matter can be scoped out of the impact assessment as significant effects from habitat loss during operation are not likely to occur.
	Disturbance – operation	(ID 4.1.5) Inspectorate agrees that effects of noise and vibration as a result of the flow of fuel in the pipeline and the operation of valves, can be scoped out of the ES on the basis of low likelihood of significant effects. However, 'the Inspectorate considers that the ES should clearly describe the proposed operational development and assess impacts on relevant species receptors as a result of changes to noise, vibration and lighting, from the operational development, where significant effects are likely to occur.
Dormouse	Mortality and injury – operation	(ID 4.1.1) The Inspectorate agrees that this potential effect can be scoped out of the impact assessment given the absence of a potential effect pathway.
	Habitat loss/gain, fragmentation or modification – operation	(ID 4.1.3) The Inspectorate agrees that this matter can be scoped out of the impact assessment as significant effects from habitat loss during operation are not likely to occur.
Great crested newt	Mortality and injury – operation	(ID 4.1.2) The Inspectorate agrees that this potential effect can be scoped out of the impact assessment given the absence of a potential effect pathway.
	Habitat loss/gain, fragmentation or modification – operation	(ID 4.1.3) The Inspectorate agrees that this matter can be scoped out of the impact assessment as significant effects from habitat loss during operation are not likely to occur.
Common reptiles	Mortality and injury – operation	(ID 4.1.2) The Inspectorate agrees that this potential effect can be scoped out of the impact assessment given the absence of a potential effect pathway.



	Habitat loss/gain, fragmentation or modification – operation	(ID 4.1.3) The Inspectorate agrees that this matter can be scoped out of the impact assessment as significant effects from habitat loss during operation are not likely to occur.
Rare reptiles	Mortality and injury – operation	(ID 4.1.2) The Inspectorate agrees that this potential effect can be scoped out of the impact assessment given the absence of a potential effect pathway.
	Habitat loss/gain, fragmentation or modification – operation	(ID 4.1.3) The Inspectorate agrees that this matter can be scoped out of the impact assessment as significant effects from habitat loss during operation are not likely to occur.
Riparian mammals	Mortality and injury – operation	(ID 4.1.2) The Inspectorate agrees that this potential effect can be scoped out of the impact assessment given the absence of a potential effect pathway.
	Habitat loss/gain, fragmentation or modification – operation	(ID 4.1.3) The Inspectorate agrees that this matter can be scoped out of the impact assessment as significant effects from habitat loss during operation are not likely to occur.
	Disturbance – operation	(ID 4.1.5) Inspectorate agrees that effects of noise and vibration as a result of the flow of fuel in the pipeline and the operation of valves, can be scoped out of the ES on the basis of low likelihood of significant effects. However, 'the Inspectorate considers that the ES should clearly describe the proposed operational development and assess impacts on relevant species receptors as a result of changes to noise, vibration and lighting, from the operational development, where significant effects are likely to occur.
Other notable species	Mortality and injury – construction and operation; Habitat loss/gain, fragmentation or modification – construction and operation; and Disturbance – construction and operation	(ID 4.1.27) The Inspectorate agrees on the basis of the characteristics of the Proposed Development and the largely temporary nature of the vegetation removal which could affect other notable species identified, together with proposed mitigation measures to prevent killing/injuring, that effects on other notable species can be scoped out of the ES.
Wintering birds (outside of statutory or non-statutory designated sites)	Negligible biodiversity value	No specific response was provided by The Inspectorate. An assumption is made that there is agreement in the valuation of wintering birds outside of designated sites as negligible. As such, no significant effect, in terms of EIA, is possible. This ecological receptor has been scoped out of the assessment. Where wintering birds are features of interest of designated sites, they are assessed as a component of that site.



Matters Scoped in to the Assessment

7.2.23 Following the methods described, those matters scoped in to the assessment are summarised in Table 7.15 in Section 7.5, after presentation and consideration of the baseline (Section 7.3). These matters are assessed in Section 7.5 Potential Impacts (Without Mitigation).

Impact Significance

7.2.24 A significant effect in relation to the Environmental Impact Assessment (EIA) Regulations 2017, within the scope of this chapter, is defined as a moderate or higher adverse or beneficial effect on ecological receptors. Effects of minor or negligible significance are not considered to be significant but are used to acknowledge that there would be some changes from the baseline conditions.

7.2.25 As explained in Chapter 6 Overview of Assessment Process, significance is determined using a three-step process:

- 1) Identify value/sensitivity of a receptor.
- 2) Determine magnitude of potential impact.
- 3) Assign impact significance.

7.2.26 The criteria used to assess value/sensitivity and magnitude are described below. Impact significance was determined taking both these assessments into account, using the matrix approach provided in Section 6.3 of Chapter 6, i.e. as major, moderate, minor or negligible significance.

Value/Sensitivity

7.2.27 The topic-specific criteria for determining value of ecological receptors are shown in Table 7.4. These criteria are adapted from the CIEEM Guidelines (CIEEM, 2018), and take into account factors such as: rarity; ecosystem function; habitat diversity; connectivity; conservation status; population size; and natural range.

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

7.2.29 An assessment of effects has been carried out on those receptors determined to be of low, medium or high value and which are considered to have the potential to be significantly affected by the project.

Table 7.4: Value/Sensitivity Criteria for Biodiversity (Amended from Highways Agency, 2010)

Sensitivity/Value	Criteria
High (International/ National)	<ul style="list-style-type: none"> • International: European designated sites, including SPAs; potential SPAs (pSPAs); Special Areas of Conservation (SACs); candidate or possible SACs (cSACs or pSACs); and Wetlands of International Importance (Ramsar sites). • National: statutory designated sites, including SSSIs, National Nature Reserves (NNRs); Ancient Woodland; species recorded as 'critically endangered' under the International Union for Conservation of Nature (IUCN) Red List of Threatened Species; resident or regularly occurring populations of species which may be



Sensitivity/Value	Criteria
	<p>considered at an international or national level where either of the following criteria is met:</p> <ul style="list-style-type: none"> ➢ the loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; or ➢ the population forms a critical part of a wider population at this scale. <ul style="list-style-type: none"> • Nationally Rare or Scarce taxa: Nationally Rare taxa are those occurring in 15 or fewer 10km OS grid-squares in the UK, Nationally Scarce species in 16-99 10km squares.
Medium (Regional/County)	<ul style="list-style-type: none"> • Statutory designated sites: Local Nature Reserves (LNRs). • Non-statutory designated sites (i.e. Sites of Importance for Nature Conservation (SINCs), Sites of Nature Conservation Importance (SNCIs), Sites of Metropolitan Importance (SMI), Sites of Borough Importance (SBI)) designated in the county/regional area context. • Areas of key/Priority Habitats identified in the LBAP. • Species or habitats listed in accordance with the requirements of Section 41 of Natural Environment and Rural Communities (NERC) Act 2006. • Resident or regularly occurring populations of species which may be considered at a regional or county level where either of the following criteria is met: <ul style="list-style-type: none"> ➢ the loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or ➢ the population forms a critical part of a wider population at this scale.
Low (Local)	<p>Receptor is relatively common and widespread but has elevated conservation status (e.g. it is listed in accordance with the requirements of Section 41 of NERC Act 2006, LBAP, Birds of Conservation Concern red or amber listed, Red Data Book listed and/or is legally protected).</p>
Negligible	<p>Receptor is abundant and widespread, receives no legal protection and is not of elevated conservation concern status.</p>

Impact Magnitude

7.2.30 In accordance with the CIEEM Guidelines, the magnitude of change was determined with reference to the following characteristics to each effect, where relevant:

- positive (beneficial) or negative (adverse);
- direct, indirect, cumulative;
- magnitude: size or amount of an impact, determined on a quantitative basis;
- extent: area measures and percentage of total (e.g. percentage area of habitat/territory lost);
- duration: permanent or temporary in ecological terms (where differing timescales are determined in relation to the life-cycle of the receptor, these would be defined);
- reversibility: reversible or not reversible (can the effect be reversed, whether or not this is planned); and
- timing and frequency: important seasonal and/or life-cycle constraints and any relationship with frequency considered.

7.2.31 To provide consistency across chapters within the ES, the magnitude of change is assessed as one of four separate categories, large, medium, small and negligible, as per Chapter 6 Overview of Assessment Process and defined in Table 7.5.

Table 7.5: Impact Magnitude Criteria for Biodiversity

Magnitude	Criteria
Large	Adverse: Loss of resource or quality and integrity of resource; severe damage to key characteristics, features or elements; or Beneficial: Large scale or major improvement of resources quality; extensive restoration or major improvement of attribute quality.
Medium	Adverse: Loss of resource, but not adversely affecting its integrity; partial loss of or damage to key characteristics, features or elements; or Beneficial: Benefit to, or addition of, key characteristics, features or elements; improvements of attribute quality.
Small	Adverse: Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one or more key characteristic, feature or element; or Beneficial: Minor benefit to, or addition of, one or more key characteristic, feature or element; some beneficial effect on attribute or a reduced risk of negative effect occurring.
Negligible	Adverse: Very minor loss or detrimental alteration to one or more characteristic, feature or element; or Beneficial: Very minor benefit to, or positive addition of, one or more characteristic, feature or element.

Consultation and Engagement

7.2.32 Responses were received from consultees on the Scoping Report (Esso, 2018) in relation to biodiversity and were included in the Planning Inspectorate’s Scoping Opinion (see Chapter 5 Consultation and Scoping). In addition, detailed consultation and engagement has been used to inform each step of the process to assess potential significant effects on biodiversity, including baseline survey methodology, the design of the project, and the scope of likely relevant mitigation strategies. Those that have been engaged by the project with respect to biodiversity comprise:

- Natural England (NE);
- Environment Agency (EA);
- Local planning authorities: Winchester City Council; South Downs National Park Authority; East Hampshire District Council; Hart District Council; Rushmoor Borough Council; Surrey County Council; Surrey Heath Borough Council; Runnymede Borough Council; and Spelthorne Borough Council;
- Parish Councils: Froyle Parish Council; and Chobham Parish Council;
- Forestry Commission;
- Hampshire and Isle of Wight Wildlife Trust (HloWWT);
- Surrey Wildlife Trust (SWT);
- Ministry of Defence (MoD);
- Cove Valley Greenway Group;
- Chobham Common Preservation Committee; and
- Amphibian and Reptile Conservation Trust.

7.2.33 Table 7.6 summarises relevant engagement undertaken in relation to biodiversity, notably where this influenced the scope of the assessment or the scheme’s design.



Table 7.6: Summary of Engagement Relevant to the Biodiversity Assessment

Date	Report/Meeting	Summary of Key Points
7 February 2018	Environmental Workshop	<ul style="list-style-type: none"> • Introduction of the project to environmental consultees (the Environment Agency, Natural England and Historic England).
1 May 2018	Surrey Wildlife Trust (SWT) – meeting at SWT’s office, Pirbright.	<ul style="list-style-type: none"> • The discussion focussed on SWT managed sites within Colony Bog and Bagshot Heath SSSI and Chobham Common SSSI that were located within the initial pipeline corridors provided at Scoping. There was also discussion relating to the proposed scope of the ecological assessment. • SWT tentatively supported the justification for a corridor through the SSSIs (i.e. based on location of existing Esso pipelines) but strongly opposed any routing options that would affect the Folly Bog area within Colony Bog and Bagshot Heath SSSI. • SWT indicated that construction works in the existing track and dry habitat areas would be generally acceptable, although they requested more detailed information when known. SWT preferred that wet heath habitats be avoided if possible or appropriate engineering/construction solutions provided.
3 May 2018	Hart, Winchester and East Hampshire local authority ecologists – meeting at Jacobs office, Winnersh.	<ul style="list-style-type: none"> • The discussion focussed on the initial pipeline corridors and the proposed scope of the ecological assessment, including the draft survey strategy. • The officers who attended the meeting voiced no objections with respect to the initial pipeline corridors or the proposed approach to the ecological assessment.
16 May 2018	South Downs National Park Authority (SDNPA) – meeting at SDNPA offices, Midhurst	<ul style="list-style-type: none"> • The discussion focussed on the initial pipeline corridors and the proposed scope of the ecological assessment, including the survey strategy. • The importance of woodland, hedgerows, chalk streams and chalk grassland habitats was stressed by South Downs National Park Authority (SDNPA). • SDNPA stated their desire for an Environmental Clerk of Works to be appointed to oversee works at sensitive locations.
18 May 2018	Natural England (NE) – letter in response to informal consultation relating to the draft environmental survey strategy	<ul style="list-style-type: none"> • NE stated that <i>‘In general it is likely that in those areas where impacts to species can be avoided or identified as low, no matter what species are present, how they are using habitats and in what numbers, the implementation of less intense survey methodologies can be justified’</i>. • <i>‘Where the risk of impacts to species could be medium or high, NE would require proportionally greater survey effort to ensure a thorough understanding of what species are present, how species are using the site and the impacts’</i>. • The submission of information to inform both the Letter of No Impediment (LONI) and the future licence applications will all need to <i>‘demonstrate full consideration of the mitigation hierarchy and be able to adequately justify why avoidance has not been possible in situations where this applies’</i>.



Date	Report/Meeting	Summary of Key Points
		<ul style="list-style-type: none"> • Badger - <i>In situations where the risk of an impact to a badger sett is likely to be medium or high, Natural England is unlikely to be able to issue a LONI with no ground survey having been completed for this species.</i> • Bats - <i>In situations where impacts to bat species would be avoided or low it is likely Natural England would be able to accept no further survey effort (such as emergence) especially if low impact scenarios can be adequately mitigated for ultimately resulting in no net impact to the species. Natural England would not be able to issue a LONI if the potential for medium-high impacts are identified but insufficient data is available to be able to identify the mitigation and/or compensation that would be required to maintain the favourable conservation status of the species.</i> • Great crested newt - <i>The proposal to survey up to 250m either side of the pipeline corridor is likely to be considered adequate but consideration should be given to potential scenarios where ponds are located over 250m. Population size class assessment is only likely to be considered necessary for situations where there will be very high impacts to a particular metapopulation of Great Crested Newts.</i> • Dormouse - <i>NE would be willing to accept a combination of the use of pre-existing baseline survey data and good habitat and connectivity assessment methodologies in place of fresh survey data. Nut searches were not recommended as a core aspect of survey methodology.</i>
14 June 2018	Environmental Forum - Update of project development with NE and Environment Agency (EA)	<ul style="list-style-type: none"> • Jacobs' ecologist confirmed that comments on the draft environmental survey strategy had helped shape the detailed ecological survey methodologies. • Confirmation that surveys were being undertaken and targeted to provide a robust baseline, and give comfort to NE and EA that sufficient survey effort is being made, while avoiding unnecessary surveys where presence can be assumed or impacts can be avoided.
23 and 24 July 2018	NE and SWT – site meeting at Bourley and Long Valley SSSI (NE only), Colony Bog and Bagshot Heath SSSI and Chobham Common SSSI	<ul style="list-style-type: none"> • A site meeting to view the areas within the preferred corridor and to discuss site-specific concerns and opportunities. • NE supported the proposal for construction activities to avoid the breeding season of the qualifying species of the Thames Basin Heaths SPA. NE advised that this constraint could be lifted at locations where the habitat was unsuitable for the qualifying species. • NE advised that the project should seek to deliver a 'biodiversity net gain' and that this should be reported in the Environmental Statement (ES) and Habitats Regulations Assessment (HRA) Report. • Potential habitat enhancement opportunities were identified at Bourley and Long Valley SSSI, including realigning the preferred corridor into adjacent conifer woodland so that it could be reinstated as heathland. Possible impacts and mitigation measures relating to wetland habitats were discussed. • SWT advised that Folly Bog in Colony Bog and Bagshot Heath SSSI is highly sensitive and should be avoided. SWT identified other wetland habitats within the preferred corridor. • At Chobham Common SSSI, SWT and NE agreed that it was preferable for the proposed pipeline to follow the existing access track as closely as possible. Possible impacts and mitigation measures relating to wetland habitats



Date	Report/Meeting	Summary of Key Points
		<p>were discussed. Small blocks of pine and scrub within the preferred corridor were noted and the removal of these by the project and reinstatement as heathland would be considered a habitat enhancement.</p>
30 August 2018	<p>Scoping Workshop – attendees included NE, and Runnymede Borough Council’s Biodiversity Officer</p>	<ul style="list-style-type: none"> • Confirmation that trenchless construction techniques under the Basingstoke Canal would also permit avoidance of canal paths and habitats on canal embankments. • Jacobs’ teams confirmed that impact on Ancient Woodland Inventory sites and other woodland would be assessed.
14 September 2018	<p>HloWWT – site meeting at Bourley and Long Valley SSSI</p>	<ul style="list-style-type: none"> • A site meeting to view the areas within the preferred corridor and to discuss site-specific concerns and opportunities. • Potential opportunities for biodiversity were discussed, including the felling of conifer woodland to enable heathland restoration. HloWWT supported this as impacts to an area of heathland in favourable condition could be avoided. • Possible tree felling on the edges of wet heath habitat were considered desirable in line with the conservation objectives of the SSSI.
19 September 2018	<p>Chobham Common Preservation Committee (CCPC) – site meeting at Chobham Common SSSI.</p>	<ul style="list-style-type: none"> • A site meeting arranged at CCPC’s request so that they could share their local knowledge of Chobham Common with the project team. • CCPC stated that the route corridor option through Chobham Common SSSI was generally preferred as this would require fewer trees to be felled than the option to the south via Stonehill Road. • A feature called One Tree Hill is of local historic and landscape importance.
20 September 2018	<p>NE - meeting to discuss reptiles – Jacobs office, Southampton</p>	<ul style="list-style-type: none"> • A meeting with NE’s herpetologist to discuss the project’s survey strategy, mitigation proposals and EPS Mitigation licensing for sand lizard (<i>Lacerta agilis</i>). • NE supported the project’s reptile survey strategy and stated that the use of historic records to confirm the presence of sand lizard was appropriate. • NE recommended that a Habitat Suitability Mapping exercise would be useful to inform an impact assessment for sand lizard (but also other reptiles) at Chobham Common SSSI and Colony Bog and Bagshot Heath SSSI. • The potential conflict between ground breeding birds and the timing of habitat manipulation mitigation was discussed. NE stated that habitat manipulation during the reptile hibernation season was acceptable, provided that care was taken to reduce the risk of affecting possible adder (<i>Vipera berus</i>) hibernacula. • NE agreed that habitat manipulation was an appropriate mitigation strategy, rather than fencing, trapping and removing reptiles from within the Order Limits.
26 September 2018	<p>Surrey Heath Borough Council (SHBC)</p>	<ul style="list-style-type: none"> • A site meeting to view the area of Turf Hill within the preferred corridor and to discuss site-specific concerns and opportunities. • Removal of gorse and pine scrub would be desirable to aid heathland restoration.



Date	Report/Meeting	Summary of Key Points
	Greenspace Officer (Countryside) – site meeting, Turf Hill unit of the Colony Bog and Bagshot Heath SSSI	<ul style="list-style-type: none"> • SHBC stated that the avoidance of wet heath habitat would be preferred. • The presence of sand lizard was discussed. • SHBC agreed that natural regeneration was the preferred method of reinstatement.
4 October 2018	Hart District Council Biodiversity Officer and Greenspace Manager – site meeting at Ewshot Meadows SINC and Wakefords Copse, Crondall SINC	<ul style="list-style-type: none"> • A site meeting to discuss the preferred corridor in relation to Ewshot Meadows SINC and Wakefords Copse, Crondall SINC and the Crookham Park SANG. • Hart District Council stated that at Ewshot Meadows SINC, scrub encroachment is reducing the biodiversity value of the site. Hart District Council declared no concerns relating to impacts on a pond in the SANG close to Naishes Lane. • Agreement that natural regeneration was the preferred approach to reinstatement post-construction.
10 October 2018	Rushmoor Borough Council Biodiversity Officer – consultation response to sub-options and the proposed route	<ul style="list-style-type: none"> • Positive comments on drilling under identified sensitive sites. • Although the Eelmoor SSSI would be avoided it is important that there is no damage to any part of the SSSI through habitat loss or pollution from adjacent works. • A proposed construction compound next to Ball Hill SINC should also reduce or avoid indirect impacts on the site.
18 October 2018	SWT – Consultation response to sub-options and the proposed route	<ul style="list-style-type: none"> • Identification of additional SNCI within the preferred corridor. • Potential opportunities for improved Priority Habitat connectivity through appropriate habitat creation and restoration were discussed.
18-19 October 2018	NE – site meeting with NE’s herpetologist to discuss reptiles at Bourley and Long Valley SSSI, Colony Bog and Bagshot Heath SSSI and Chobham Common SSSI	<ul style="list-style-type: none"> • Mapping exercise to identify the value of SSSI heathland habitats affected by the project for rare and common reptile species. This is reported in Appendix 7.10 Reptile Factual Report. • Chobham Common SSSI – NE advised that the conservation status of reptiles would only be affected if key hibernation sites were affected without mitigation. • Colony Bog and Bagshot Heath SSSI (excluding Turf Hill) – habitat features of potential value for common reptiles were identified. • Turf Hill – All heathland habitats have high potential for reptiles, including sand lizard. Habitat compensation considered critical if impacts to sand lizard habitat cannot be avoided. • Bourley and Long Valley SSSI – Tree felling would allow the reinstatement of habitats suitable for common reptiles.
31 October 2018	Rushmoor Borough Council – site visit with Biodiversity Officer	<ul style="list-style-type: none"> • Queen Elizabeth Park – Biodiversity Officer stated that the woodland here was in ‘<i>poor ecological condition</i>’ and would benefit from ‘<i>the removal of rhododendron and secondary woodland thinning</i>’. Relocation of bat boxes on trees within the Order Limits would be considered by Rushmoor Borough Council prior to works.



Date	Report/Meeting	Summary of Key Points
		<ul style="list-style-type: none"> • Pyestock Hill/Pondtail Heath SINC – agreed that fencing would be installed prior to works to protect adjacent Ancient Woodland. Limited opportunities for biodiversity enhancements due to continued MoD use. • Old Ively Road – good practice measures to protect trees on roadside were discussed. • Southwood Golf Course SANG – Biodiversity Officer stated preference for <i>retention</i> of Wet Woodland as a Priority Habitat. • Cove Brook Grassland SINC and Cove Valley Southern Grassland SINC – Biodiversity Officer concerns on impacts on trees.
27 November 2018	Environmental Forum workshop with NE, Hart District Council and SWT	<ul style="list-style-type: none"> • Confirmation that Potential Ancient Woodland Sites (less than 2ha) i.e. not included in the Ancient Woodland Inventory (Natural England, 2018), would be included in the impact assessment. • Summary of surveys undertaken – consultees expressed confidence in information gathered being sufficient to inform routing. • Confirmation that ES will include survey findings, and factual reports and draft EPS licences will be linked to the Biodiversity chapter. • Discussion on potential environmental investment opportunities.
17 January 2019	MoD	<ul style="list-style-type: none"> • MoD’s Senior Ecologist did not voice any specific ecology concerns. • Close liaison with MoD required prior to vegetation clearance as tree clearances could negatively impact military training.



Limitations of Assessment

- 7.2.34 Where possible, nationally recognised standard survey methodologies were used to reduce limitations for ecological evaluation and impact assessment.
- 7.2.35 Information relating to the presence of protected and notable species has been requested from Surrey Biodiversity Information Centre throughout 2018. Although non-statutory designated site information has been provided, species information has not been received and so a precautionary approach to the geographical scope of field surveys in Surrey has been adopted.
- 7.2.36 Specific limitations relevant to each survey, such as land access constraints, are detailed in the relevant factual reports found in Appendices 7.1 to 7.12. The survey-specific constraints do not represent a limitation that would compromise the ecological impact assessment, especially when taking account of the project's embedded designs and good practice measures. As such, the baseline information that has been gathered is robust and is suitable for assessment purposes.

7.3 Baseline Conditions

Statutory Designated Sites

- 7.3.1 A range of statutory designated sites were identified within 1km of the Order Limits. These sites included European sites and nationally designated sites. Table 7.7 summarises each of these statutory designated sites (listed from south to north along the route) and describes their position relative to the Order Limits. The sites are shown on Figure 7.1.
- 7.3.2 Statutory designated sites associated with the Solent and Southampton Water (to the south of Section A), comprising an SAC, SPA, potential SPA (pSPA), Ramsar site and component SSSIs, were also identified by the desk study. These sites are beyond the 1km study area but have hydrological links to the project via the River Hamble and its tributaries which are within the Order Limits. These sites are also detailed in Table 7.7.
- 7.3.3 No SACs with bat species as a qualifying feature are located within 10km of the Order Limits.
- 7.3.4 Based on their designation, all identified statutory designated sites are valued as high.
- 7.3.5 Chertsey Meads LNR, based on its designation, would be valued as medium. However, following detailed botanical survey and a review of citation and designation criteria (see Appendix 7.1 Habitats and Botany Factual Report), the valuation of Chertsey Meads LNR has been revised to high.



Table 7.7: Statutory Designated Sites Identified

Statutory Designated Site (Ordered South to North)		Qualifying Features/Reason for Designation	Approximate Distance and Location Relative to Project
Within 1km of the Order Limits			
SAC	Thursley, Ash, Pirbright and Chobham	<u>Annex I habitats:</u> <ul style="list-style-type: none"> • 4010 Northern Atlantic wet heaths with <i>Erica tetralix</i> • 4030 European dry heaths • 7150 Depressions on peat substrates of the <i>Rhynchosporion</i> 	Within Order Limits in Section F
SPA	Thames Basin Heaths	<u>Supporting populations of European importance during the breeding season:</u> <ul style="list-style-type: none"> • Dartford warbler (<i>Sylvia undata</i>); • nightjar (<i>Caprimulgus europaeus</i>); and • woodlark (<i>Lullula arborea</i>). 	Within Order Limits in Sections D and F
	South West London Waterbodies	<u>Supporting populations of European importance over winter:</u> <ul style="list-style-type: none"> • gadwall (<i>Anas strepera</i>); and • shoveler (<i>Anas clypeata</i>). 	650m west of Section H
Ramsar	South West London Waterbodies	<u>Species occurring at levels of international importance:</u> <ul style="list-style-type: none"> • species with peak counts in spring/autumn – shoveler; and • species with peak counts in winter – gadwall. 	650m west of the end of Section H
NNR	Chobham Common	See SSSI description below	Within Order Limits in Section F
	Beacon Hill	See SSSI description below	800m east of Section A
SSSI	Beacon Hill, Warnford	Herb-rich chalk grassland flora with exceptional butterfly fauna.	800m east of Section A
	Bourley and Long Valley	A diverse mosaic of heathland, woodland, mire, scrub and grassland habitats supporting nationally scarce plants, nationally rare and scarce insects, bird species – woodlark, nightjar, Dartford warbler and hobby (<i>Falco subbuteo</i>) – and nationally important populations of adder. A component SSSI of the Thames Basin Heaths SPA.	Within Order Limits in Section D
	Basingstoke Canal	Nationally important for aquatic plants and invertebrates.	Within Order Limits in Section D



Statutory Designated Site (Ordered South to North)		Qualifying Features/Reason for Designation	Approximate Distance and Location Relative to Project
	Fleet Pond	Extensive, shallow freshwater lake supporting a rich aquatic flora and invertebrate fauna. Substantial breeding populations of reed warbler (<i>Acrocephalus scirpaceus</i>) are present and the site is an autumn and winter wildfowl resort for substantial numbers of both surface feeding and diving ducks.	590m northwest of Logistics Hub at Hartland Park in Section D
	Eelmoor Marsh	Extensive heathland including an area of deep peat with structural affinities to a raised bog supporting exceptionally rich bog flora and correspondingly diverse invertebrate fauna. A component SSSI of the Thames Basin Heaths SPA.	10m south of Section D
	Colony Bog and Bagshot Heath	Complex of mire, wet and dry heath and neutral grassland. Folly Bog is a component of the SSSI which supports bog and wet heathland habitats. A component SSSI of the Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC. Notified features of the SSSI also comprise heathland bird species and vascular plants.	Within Order Limits in Section D
	Chobham Common	Largest surviving heathland complex in the Thames Basin with nationally important breeding populations of nightjar, woodlark and Dartford warbler. Rich bryophyte and lichen flora and an important site for invertebrates. A component SSSI of the Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC. Also a NNR (see above).	Within Order Limits in Section F
	Dumsey Meadow	Unimproved neutral floodplain grassland.	Within Order Limits in Section G
	Staines Moor	Alluvial meadows with areas of open water supporting a rich and varied flora. Significant proportions of British wintering bird populations recorded. Component SSSI of South West London Waterbodies SPA.	650m west of Section H
LNR	Claylands	Secondary woodland on banks of old clay workings. Neutral grassland and ponds supporting GCN.	700m east of Section A
	Fleet Pond	Also a SSSI (see above). The largest freshwater pond in Hampshire with additional dry and wet heath, wet and dry woodland, reedbed and marsh habitats. 180 species of bird and 400 species of wild flower have been recorded.	590m northwest of Logistics Hub at Hartland Park
	Brentmoor Heath	Wet and dry heath habitats, with areas of woodland, acid grassland and ponds. Component of Colony Bog and Bagshot Heath SSSI, Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC (see above).	190m south of Section F
	Chertsey Meads	Remnant floodplain meadow on the banks of the River Thames with calcareous influences on plant flora.	Within Order Limits in Section G
	Bedfont Lakes	Willow carr, reedbeds, lakes, scrub, neutral grassland/wildflower meadows and bare soil habitats supporting a variety of bird, invertebrate, amphibian and mammal species.	790m east of Section H



Statutory Designated Site (Ordered South to North)		Qualifying Features/Reason for Designation	Approximate Distance and Location Relative to Project
Statutory designated sites over 1km from the Order Limits with hydrological connectivity			
SAC	Solent Maritime	<p><u>Annex I habitats:</u></p> <ul style="list-style-type: none"> • 1130 Estuaries; • 1320 Spartina swards (<i>Spartinion maritimae</i>); and • 1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>). <p><u>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</u></p> <ul style="list-style-type: none"> • 1110 Sandbanks which are slightly covered by sea water all the time; • 1140 Mudflats and sandflats not covered by seawater at low tide; • 1150 Coastal lagoons (Priority feature); • 1210 Annual vegetation of drift lines; • 1220 Perennial vegetation of stony banks; • 1310 Salicornia and other annuals colonizing mud and sand; and • 2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes'). <p><u>Annex II species present as a qualifying feature, but not a primary reason for site selection:</u></p> <p>1016 Desmoulin's whorl snail (<i>Vertigo moulinsiana</i>)</p>	1.85km south of Section A (linked by River Hamble)
SPA	Solent and Southampton Water	<p><u>Supporting populations of European importance</u></p> <p><u>During the breeding season:</u></p> <ul style="list-style-type: none"> • common tern (<i>Sterna hirundo</i>); • little tern (<i>Sterna albifrons</i>); • Mediterranean gull (<i>Larus melanocephalus</i>); • roseate tern (<i>Sterna dougallii</i>); and • Sandwich tern (<i>Sterna sandvicensis</i>). <p><u>Over winter:</u></p> <ul style="list-style-type: none"> • black-tailed godwit (<i>Limosa limosa islandica</i>); • dark-bellied brent goose (<i>Branta bernicla bernicla</i>); • ringed plover (<i>Charadrius hiaticula</i>); and • teal (<i>Anas crecca</i>). 	



Statutory Designated Site (Ordered South to North)		Qualifying Features/Reason for Designation	Approximate Distance and Location Relative to Project
		Assemblage of international importance – supporting over 20,000 waterfowl	
pSPA	Solent and Dorset Coast	<u>Supporting populations of European importance during the breeding season:</u> <ul style="list-style-type: none"> • Sandwich tern; • common tern; and • little tern. 	
Ramsar	Solent and Southampton Water	A mosaic of wetland habitats supporting important assemblages of rare plants and invertebrates and internationally important assemblages of wintering birds.	
SSSI	Upper Hamble Estuary and Woods	Ancient semi-natural ecologically diverse woodland saltmarsh and reedswamp. Unimproved neutral grassland also recorded. Component SSSI of Solent and Southampton Water Ramsar, Solent and Southampton Water SPA and Solent Maritime SAC.	

Non-statutory Designated Sites

- 7.3.6 Several non-statutory designated sites were identified within 1km of the Order Limits. The designation for these sites varies based on the county. In summary, the number of each category of non-statutory sites identified were:
- Site of Importance for Nature Conservation (SINC) (Hampshire): 177;
 - Road Verges of Ecological Importance (RVEI) (Hampshire): 4;
 - Site of Nature Conservation Importance (SNCI) (Surrey): 53;
 - Conservation Verges (Surrey): 1;
 - Site of Metropolitan Importance (SMI) (Greater London): 1; and
 - Sites of Borough Importance (SBI) (Greater London): 1.
- 7.3.7 The sites in Hampshire are detailed in Table 7.8. The HBIC criteria below define the categories given in the table:
- 1A - Ancient semi-natural woodlands;
 - 1B - Other woodland where there is a significant element of ancient semi-natural woodland surviving;
 - 1Cii - Other semi-natural woodland if they comprise important community types of restricted distribution in the County, such as yew woods and alder swamp woods;
 - 1D - Pasture woodland and wooded commons, not included in any of the above, which are of considerable biological and historical interest;
 - 2A - Agriculturally unimproved grasslands;
 - 2B - Semi-improved grasslands which retain a significant element of unimproved grassland;
 - 2D - Grasslands which have become impoverished through inappropriate management but which retain sufficient elements of relic unimproved grassland to enable recovery;
 - 3A - Areas of heathland vegetation; including matrices of dwarf shrub, acid grassland, valley mires and scrub;
 - 3B - Areas of heathland which are afforested or have succeeded to woodland if;
 - (i) they retain significant remnants of heathland vegetation which would enable their recovery, or
 - (ii) they are contiguous with, or form an integral part of an open area of heathland;
 - 5A - Areas of open freshwater (e.g. lakes, ponds, canals, rivers, streams and ditches) which support outstanding assemblages of floating/submerged/emergent plant species, invertebrates, birds or amphibians;
 - 5B - Fens, flushes, seepages, springs, inundation grasslands that support a flora and fauna characteristic of unimproved and waterlogged (seasonal or permanent) conditions;



- 6A - Sites which support one or more notable species; and
- 7A - Sites of nature conservation interest which occur in areas otherwise deficient in such interest, and/or are known to be of particularly high value to local communities e.g. community wildlife sites.

7.3.8 Table 7.9 summarises those non-statutory sites in Surrey and Table 7.10 those in Greater London. All non-statutory designated sites are shown on figure 7.2.

7.3.9 The majority of these sites, although having intrinsic value themselves, are often a 'buffer' to statutory designated sites, are linking habitats between statutory designated sites with potential for habitat restoration or support mobile species for which the core presence is within nearby statutory designated sites. The remaining sites often comprise Ancient Woodland habitat or support notable plant assemblages.



Table 7.8: Non-statutory Designated Sites Within 1km of the Order Limits – Hampshire

Non-statutory Designated Site	Local Authority	Criteria for Designation														Approximate Distance and Location Relative to Project
		1A	1B	1Cii	1D	2A	2B	2D	3A	3B	5A	5B	6A	7A		
Section A																
Sherecroft Farm Meadow SINC	Winchester CC (City Council)	-	-	-	-	-	-	-	-	-	-	-	■	■	-	910m southeast
Bottom Copse/Bushy Copse SINC	Eastleigh Borough Council (BC)	■	-	■	-	-	-	-	-	-	-	-	-	-	-	970m southwest
Botley Mill Woodland SINC	Winchester CC	-	-	■	-	-	-	-	-	-	-	-	-	-	-	960m southeast
Railway Field Line SINC	Winchester CC	-	-	-	-	-	-	■	-	-	-	-	-	-	-	760m southeast
Wangfield Copse SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	320m southeast
Newhouse Farm Woodland & Swamp SINC	Eastleigh BC	-	-	■	-	-	-	-	-	-	-	-	■	-	-	330m south
Marshy Grassland, Botley SINC	Eastleigh BC	-	-	-	-	-	-	-	-	-	-	-	■	-	-	290m southeast
Meadow West of Wangfield Copse SINC	Winchester CC	-	-	-	-	■	-	-	-	-	-	-	■	-	-	280m southeast
Holly Tree Farm Wood SINC	Eastleigh BC	■	-	■	-	-	-	-	-	-	-	-	-	-	-	220m southeast
Holly Tree Farm Meadow SINC	Eastleigh BC	-	-	-	-	-	-	■	-	-	-	-	■	-	-	170m southeast
Maddoxford Farm Meadows SINC	Eastleigh BC	-	-	-	-	-	-	-	-	-	-	-	■	-	-	Within Order Limits
Botley Park Wood SINC	Eastleigh BC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	470m west
Botley Golf Course Wood SINC	Winchester CC	■	-	■	-	-	-	-	-	-	-	-	-	-	-	70m northwest
Ford Lake Meadow SINC	Winchester CC	-	■	-	-	-	-	■	-	-	-	-	■	-	-	530m northwest
Ford Lake Woodland SINC	Winchester CC	■	-	■	-	-	-	-	-	-	-	-	-	-	-	880m northwest
Little Gold Copse SINC	Winchester CC	-	-	■	-	-	-	-	-	-	-	-	-	-	-	660m southeast
Mount Folly Copse (1) SINC	Winchester CC	-	■	-	■	-	-	-	-	-	-	-	-	-	-	680m southeast
Mount Folly Copse (2) SINC	Winchester CC	■	-	-	■	-	-	-	-	-	-	-	-	-	-	610m east
Calcot Plantation SINC	Winchester CC	-	■	-	■	-	-	-	-	-	-	-	-	-	-	825m east



Non-statutory Designated Site	Local Authority	Criteria for Designation														Approximate Distance and Location Relative to Project
		1A	1B	1Cii	1D	2A	2B	2D	3A	3B	5A	5B	6A	7A		
Brokes Gully South SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	410m east
Railway Copse SINC	Winchester CC	■	■	-	-	-	-	-	-	-	-	-	-	-	-	880m east
Calcot Farm Meadow 1 SINC	Winchester CC	■	-	-	-	-	■	-	-	-	-	-	-	■	-	850m east
Calcot Row SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	990m east
Deorlye Wood (Gunner's/Brokes Copses) SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	430m east
Calcot Farm Meadow 3 SINC	Winchester CC	-	-	-	-	-	-	■	-	-	-	-	-	-	-	300m east
Durley Hill Copse SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	10m west
Mincingfield Copse SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	610m east
Parker's Copse/Fir Plantation/Greenwood SINC	Winchester CC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	920m west
Albany Farm, Bishop's Waltham SINC	Winchester CC	-	-	-	-	-	-	■	-	-	-	-	-	-	-	530m southeast
Kimbers Copse SINC	Winchester CC	■	■	-	-	-	-	-	-	-	-	-	-	-	-	440m northwest
Wintershill Farm Woodland SINC	Winchester CC	■	■	■	-	-	-	-	-	-	-	-	-	-	-	200m northwest
Claylands SINC	Winchester CC	-	-	-	■	-	-	-	-	-	-	-	-	■	-	770m southeast
Lower Claylands Meadow SINC	Winchester CC	-	-	-	■	-	-	-	-	-	-	-	-	■	-	850m southeast
Claylands Field North SINC	Winchester CC	-	-	-	-	-	■	-	-	-	-	-	-	-	-	920m southeast
Redlands Copse SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	650m west
Peak/ West/ Blackmans Copses SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	360m west
C9 Belmore Upham RVEI	Winchester CC	Fair to moderate chalk flora														5m south
Stephen's Castle Down (East) SINC	Winchester CC	-	-	-	■	-	-	-	-	-	-	-	-	■	-	5m east
Franklin Wood SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	930m east
Roadside Row, Stakes Lane SINC	Winchester CC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	380m east



Non-statutory Designated Site	Local Authority	Criteria for Designation														Approximate Distance and Location Relative to Project
		1A	1B	1Cii	1D	2A	2B	2D	3A	3B	5A	5B	6A	7A		
Boundary Row SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	160m east
Priest Wood, Upham SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	380m west
Sycamore Row SINC	Winchester CC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	950m east
Sergeant's Copse SINC	Winchester CC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	280m east
King's Copse SINC	Winchester CC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	310m east
Little Preshaw Copse SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	300m east
Shellets Copse SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	800m east
St Clair's Farm - Kings Row 2 SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	630m east
Sailors Lane Rows SINC	Winchester CC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	630m east
St Clair's Farm - Kings Row 1 SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	440m east
Hazards Copse SINC	Winchester CC	■	■	-	-	-	-	-	-	-	-	-	-	-	-	570m east
Downleaze Copse SINC	Winchester CC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	810m east
Downleaze Row SINC	Winchester CC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	790m east
Crookhorn Copse SINC	Winchester CC	■	■	-	-	-	-	-	-	-	-	-	-	-	-	210m east
Sailors Wood SINC	Winchester CC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	90m east
Keepers Row SINC	Winchester CC	■	▬	-	-	-	-	-	-	-	-	-	-	-	-	570m west
Keepers Copse SINC	Winchester CC	■	▬	-	-	-	-	-	-	-	-	-	-	-	-	490m west
Preshaw Wood SINC	Winchester CC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	20m west
Love Lane Wood SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	670m west
Lomers Row SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	5m east
Wyn Row SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	360m west
Riversdown House Woodland SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	290m east
Riversdown Wood SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	30m east
Blackhouse Row SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	20m east



Non-statutory Designated Site	Local Authority	Criteria for Designation														Approximate Distance and Location Relative to Project
		1A	1B	1Cii	1D	2A	2B	2D	3A	3B	5A	5B	6A	7A		
Kilmiston Copse SINC	Winchester CC	■	■	-	-	-	-	-	-	-	-	-	-	-	-	800m northwest
West Wood 2 SINC	Winchester CC	■	■	-	-	-	-	-	-	-	-	-	-	-	-	770m east
Blackhouse Copse SINC	Winchester CC	■	■	-	-	-	-	-	-	-	-	-	-	■	-	150m west
Broom Wood SINC	Winchester CC	■	■	-	-	-	-	-	-	-	-	-	-	-	-	680m west
West Wood 1 SINC	Winchester CC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	240m east
Brockwood Copse and Roadside Strips SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	■	-	Within Order Limits
Joan's Acre Woods SINC	Winchester CC	■	■	-	-	-	-	-	-	-	-	-	-	■	-	5m north
Inwood Copse SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	700m east
Moon's Copse SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	360m east
Joan's Acre House Copse SINC	Winchester CC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	140m west
Brockwood Park, Area A SINC	Winchester CC	-	-	-	-	-	■	-	-	-	-	-	-	-	-	30m east
Manor Farm Copse, Bramdean SINC	Winchester CC	■	■	-	-	-	-	-	-	-	-	-	-	-	-	760m west
Bramdean Copse SINC	Winchester CC	■	■	-	-	-	-	-	-	-	-	-	-	-	-	600m west
A272 Petersfield Road RVEI	Winchester CC	Lowland meadow/marsh flora.														900m northwest
Section B																
Woodcote Copse SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	200m west
The Rookery SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	900m northwest
Bramdean Common - The Plantation SINC	East Hampshire District Council (DC)	■	■	-	-	-	-	-	-	-	-	-	-	-	-	100m west
Bramdean Common SINC	East Hampshire DC	-	-	-	■	-	-	-	-	-	-	-	-	-	-	20m west
River Arle (two sections) SINC	Winchester CC	-	-	-	-	-	-	-	-	-	■	-	-	-	-	640m west of construction hub
Sutton Wood & Gascombs Copse SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	600m north of construction hub



Non-statutory Designated Site	Local Authority	Criteria for Designation														Approximate Distance and Location Relative to Project
		1A	1B	1Cii	1D	2A	2B	2D	3A	3B	5A	5B	6A	7A		
Wyatt's Wood SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	590m east
Park Wood, Ropley SINC	Winchester CC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	810m west
Lyeland Wood SINC	East Hampshire DC	■	■	-	-	-	-	-	-	-	-	-	-	■	-	560m west
Ropley Wood SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	380m west
Knight's Wood & Small Outlier SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	690m east
Inham's Wood SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	260m east
Merryfield Grove SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	1m north
Little Down SINC	East Hampshire DC	-	-	-	■	■	-	-	-	-	-	-	-	-	-	5m west
Westfield Copse, Ropley SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	450m west
Winchester Wood SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	880m east
Swelling Hill SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	815m west
Old Down Wood SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	885m west
Marylane Copse & Plantation	East Hampshire DC	■	■	-	-	-	-	-	-	-	-	-	-	-	-	380m south
Alton Lane, Four Marks 2 SINC	East Hampshire DC	-	-	-	-	-	-	-	-	-	-	-	-	-	■	630m northwest
Two Acres Nursery Road Verge SINC	East Hampshire DC	-	-	-	-	-	-	-	-	-	-	-	-	■	-	630m northwest
Alton Lane, Four Marks SINC	East Hampshire DC	-	-	-	-	-	-	-	-	-	-	-	-	-	■	860m northwest
U228 Alton Lane, Four Marks 2 RVEI	East Hampshire DC	high value to local communities of violet helleborine.														630m northwest
U228 Alton Lane, Four Marks RVEI	East Hampshire DC	high value to local communities of violet helleborine.														860m northwest
Battles Copse SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	10m south
Firtree Copse SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	900m north
Greenwood's Copse South SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	930m north
Hughes Copse SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	5m north
Southfield Copse SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	170m north
Ruddick's Copse SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	330m north



Non-statutory Designated Site	Local Authority	Criteria for Designation														Approximate Distance and Location Relative to Project
		1A	1B	1Cii	1D	2A	2B	2D	3A	3B	5A	5B	6A	7A		
Kitcombe Wood SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	635m south
Woodside Row SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	45m north
Imbook Copse SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	270m northwest
Crocklands Copse SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	600m north
Imbrook Row SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	400m north
Southfield Row SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	225m north
Noar Copse SINC	East Hampshire DC	■	■	-	-	-	-	-	-	-	-	-	-	■	-	2m north
Chawton Churchyard SINC	East Hampshire DC	-	-	-	-	-	-	-	-	-	-	-	-	■	-	610m west
Peck Copse SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	■	-	30m east
Chawton Park Wood SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	20m northwest
Chawton Paceway SINC	East Hampshire DC	-	-	-	-	■	-	-	-	-	-	-	-	■	-	30m northwest
Chawton Park Row 1 SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	180m northwest
Lord Mayor Treloar Hospital SINC	East Hampshire DC	-	-	-	-	-	-	■	-	-	-	-	-	-	-	525m northwest
Ackender Wood/Alexandra Wood SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	370m northwest
Section C																
Water Lane SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	Within Order Limits
Monk Wood SINC	East Hampshire DC	■	■	-	-	-	-	-	-	-	-	-	-	■	-	60m east
Neatham Farm Manor Copse SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	1m east
Stirvill's Copse SINC	East Hampshire DC	■	-	-	-	-	-	■	-	-	-	-	-	-	-	410m east
Gaston Copse, Isington SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	900m east
Chestnut Copse SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	740m east
Froyle Mill Meadow 7 SINC	East Hampshire DC	-	-	-	-	■	-	-	-	-	-	-	-	-	-	620m east
Spollycombe Copse SINC	East Hampshire DC	-	■	-	-	-	-	-	-	-	-	-	-	-	-	920m northwest



Non-statutory Designated Site	Local Authority	Criteria for Designation														Approximate Distance and Location Relative to Project
		1A	1B	1Cii	1D	2A	2B	2D	3A	3B	5A	5B	6A	7A		
Round Wood SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	330m west
Quarry Bottom SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	90m east
Froyle Quarry SINC	East Hampshire DC	-	-	-	-	■	-	-	-	-	-	-	-	-	-	950m west
Locks Grove SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	125m east
Steers Copse SINC	East Hampshire DC	■	-	-	-	-	-	-	-	-	-	-	-	-	-	910m east
Gravelly Wood SINC	Hart District Council	■	-	-	-	-	-	-	-	-	-	-	-	-	-	570m west
Barley Pound Copse SINC	Hart District Council	■	-	-	-	-	-	-	-	-	-	-	-	-	-	400m east
Dick's Wood SINC	Hart District Council	■	-	-	-	-	-	-	-	-	-	-	-	-	-	50m east
Lee Wood, Crondall SINC	Hart District Council	■	-	-	-	-	-	-	-	-	-	-	-	-	-	270m west
Section D																
Clare Park Meadow SINC	Hart District Council	-	-	-	-	■	-	-	-	-	-	-	-	-	-	670m southeast
The Mount, Crondall SINC	Hart District Council	-	■	-	-	-	-	-	-	-	-	-	-	-	-	500m southeast
The Withys/ Pond Copse SINC	Hart District Council	-	■	-	-	-	-	-	-	-	-	-	-	-	-	960m east
Lawn Copse SINC	Hart District Council	■	-	-	-	-	-	-	-	-	-	-	-	-	-	20m east
The Warren, Crondall SINC	Hart District Council	-	■	-	-	-	-	-	-	-	-	-	-	-	-	410m east
Withy Copse (Remnant) SINC	Hart District Council	■	-	-	-	-	-	-	-	-	-	-	-	-	-	190m west
Bushylease Wood, Ewshot SINC	Hart District Council	-	■	-	-	-	-	-	-	-	-	-	-	-	-	100m east
Ewshot Wood SINC	Hart District Council	■	■	-	-	-	-	-	-	-	-	-	-	-	-	1m east
Skains Copse/ Combe Wood/ Turners Copse SINC	Hart District Council	■	-	-	-	■	-	-	-	-	-	-	■	-	-	1m east
Woodlands A, B & D Meadows SINC	Hart District Council	-	-	-	-	■	-	■	-	-	-	■	■	-	-	80m east
Redfield Rows (South-East Remnant) SINC	Hart District Council	■	-	-	-	-	-	-	-	-	-	-	-	-	-	620m west
Pilriden Copse SINC	Hart District Council	■	-	-	-	-	-	-	-	-	-	-	-	-	-	400m east
Riddings Copse and Shaw SINC	Hart District Council	■	-	-	-	-	-	-	-	-	-	-	-	-	-	30m north



Non-statutory Designated Site	Local Authority	Criteria for Designation														Approximate Distance and Location Relative to Project
		1A	1B	1Cii	1D	2A	2B	2D	3A	3B	5A	5B	6A	7A		
Redfield Rows SINC	Hart District Council	■	■	-	-	-	-	-	-	-	-	-	-	-	-	670m west
Redfield Cottage Farm Meadow SINC	Hart District Council	-	-	-	-	-	■	-	-	-	-	■	-	-	995m west	
Long Gut Copse SINC	Hart District Council	■	-	-	-	-	-	-	-	-	-	-	■	-	220m east	
Ewshot Meadows SINC	Hart District Council	-	-	-	-	■	-	-	-	-	-	■	■	-	Within Order Limits	
Meadow near Soanes Copse SINC	Hart District Council	-	-	-	-	-	-	■	-	-	-	-	-	-	Within Order Limits	
Beacon Hill/ Parkhurst Hill SINC	Hart District Council	-	■	-	-	-	-	-	-	■	■	-	■	-	240m south	
Wakefords Copse, Crondall SINC	Hart District Council	■	-	-	■	-	-	-	-	-	-	-	-	-	Within Order Limits	
Soanes Copse/ Wood Copse SINC	Hart District Council	-	-	-	■	-	-	-	-	-	-	-	-	-	90m west	
Greendane Copse SINC	Hart District Council	-	■	-	-	-	■	-	■	-	-	-	-	-	5m east	
Velmead Road Heath SINC	Hart District Council	-	-	-	-	-	-	-	-	■	-	-	-	-	720m northwest	
Pyestock Hill/ Pondtail Heath SINC	Hart District Council	-	-	-	-	-	-	-	■	■	-	-	■	-	Within Order Limits	
Fleet Pond Woods (East) SINC	Hart District Council	-	-	-	-	-	-	-	■	■	-	-	-	-	500m north of construction logistics hub	
Sankey Lane Meadow SINC	Hart District Council	-	-	-	■	-	-	-	-	-	-	-	■	-	820m north of construction logistics hub	
Pyestock (Playing Field) SINC	Hart District Council	-	-	-	■	-	-	-	-	-	-	-	■	-	95m north	
Pyestock (Fairway) SINC	Hart District Council	-	-	-	■	-	-	-	-	-	-	-	■	-	5m south of construction logistic hub	
Pyestock (North Grasslands) SINC	Hart District Council	-	-	-	■	-	-	-	-	-	-	-	■	-	Within Order Limits at construction logistic hub	
Bramshot Common SINC	Hart District Council	-	-	-	-	-	-	-	■	■	-	-	-	-	180m north	
Southwood (Kennels Lane) SINC	Hart District Council	-	-	-	■	-	-	-	■	■	-	-	■	-	100m north	
Ball Hill SINC	Rushmoor Borough Council	-	-	-	-	■	-	-	-	-	-	-	■	-	1m south	



Non-statutory Designated Site	Local Authority	Criteria for Designation													Approximate Distance and Location Relative to Project
		1A	1B	1Cii	1D	2A	2B	2D	3A	3B	5A	5B	6A	7A	
South of Ively Road SINC	Rushmoor Borough Council	-	-	-	-	-	-	-	-	-	-	-	-	-	Within Order Limits
Southwood Woodlands SINC	Rushmoor Borough Council	-	-	■	-	■	-	■	-	■	-	-	■	-	210m north
Farnborough Airfield SINC	Rushmoor Borough Council	-	-	-	■	■	-	-	■	■	-	■	■	-	170m south
Section E															
Cove Brook Grassland SINC	Rushmoor Borough Council	-	-	-	-	-	-	-	-	-	-	■	-	-	Within Order Limits
Cove Valley, Southern Grassland SINC	Rushmoor Borough Council	-	-	■	-	-	-	■	-	-	-	-	-	-	Within Order Limits
St John's Churchyard, Farnborough SINC	Rushmoor Borough Council	-	-	-	■	-	-	-	■	-	-	■	-	-	150m northwest
Farnborough Town Cemetery SINC	Rushmoor Borough Council	-	-	-	-	-	■	-	-	-	-	-	■	-	140m south
Ship Lane Cemetery SINC	Rushmoor Borough Council	-	-	-	-	-	■	-	-	-	-	-	-	-	10m south
Blackwater Valley, Frimley Bridge SINC	Rushmoor Borough Council	-	-	■	-	-	■	-	■	-	■	■	■	-	Within Order Limits

Table 7.9: Non-statutory Designated Sites Within 1km of the Order Limits – Surrey

Non-statutory Designated Site (Ordered South to North)	Local Authority	Criteria for Designation	Approximate Distance and Location Relative to Project
Section E			
Hay Meadows west of Coleford Bridge SSCI	Surrey Heath Borough Council	Species rich meadows.	420m south
Coleford Bridge SSCI	Surrey Heath Borough Council	Wetland, open water, grassland and scrub habitats.	430m south
Frimley Hatches (including Frimley Reedbeds) SSCI	Surrey Heath Borough Council	Wetland, open water, grassland and wet woodland habitats. It is one of the best sites in the Blackwater Valley for visiting winter wildfowl.	Within Order Limits
Richmond Hill SSCI	Surrey Heath Borough Council	Remnant heathland vegetation and woodland that has the potential to be restored to heath.	290m south
Frith Hill SSCI	Surrey Heath Borough Council	Large area of heathland, (including H3 <i>Ulex minor-Agrostis curtisii</i> heath, a community uncommon in Surrey) and woodland that has the potential to be restored to heath.	Within Order Limits
Frimley Fuel Allotments SSCI	Surrey Heath Borough Council	The site comprises valuable lowland dry heathland vegetation types, with areas of wooded heath that have heathland restoration potential.	Within Order Limits
Deepcut Barracks North SSCI	Surrey Heath Borough Council	Heath, acid grassland and woodland areas with the potential to be restored.	250m south
Section F			
Camberley Heath Golf Course SSCI	Surrey Heath Borough Council	Heath and acid grassland, and for the potential of the woodland to be restored to heath.	425m west
White Hill SSCI	Surrey Heath Borough Council	Heathland habitat, including H3 <i>Ulex minor-Agrostis curtisii</i> heath. Woodland areas have potential to be restored to heath. The tracks on the site have a number of arable weed/disturbed ground species of interest.	10m north
High View Road SSCI	Surrey Heath Borough Council	Small area of heathland and relict heath.	650m north
Black Hill SSCI	Surrey Heath Borough Council	Small areas of heathland including H3 <i>Ulex minor-Agrostis curtisii</i> heath & woodland which has the potential to be restored to heath.	900m north
Dunross Farm SSCI	Surrey Heath Borough Council	Heathland and acid grassland habitats. The pine woodland has	200m north



Non-statutory Designated Site (Ordered South to North)	Local Authority	Criteria for Designation	Approximate Distance and Location Relative to Project
		the potential to be restored to heath.	
Lightwater Country Park SNCI	Surrey Heath Borough Council	Heathland and woodland that has potential to be restored to heath. Also mire habitat associated with the lake which supports the Surrey Rare Bog Myrtle.	875m north
The Folly SNCI	Surrey Heath Borough Council	Wet Woodland, unimproved wet grassland.	1m south
Field between Hook and Priest Lanes SNCI	Surrey Heath Borough Council	Unimproved wet meadow habitat. Fourteen species typical of grassland of conservation interest were recorded in 2012. Brown trout (<i>Salmo trutta</i>) has been reported in the stream.	910m south
Freemantle Field SNCI	Surrey Heath Borough Council	Wet, possibly unimproved grassland.	70m north
Land north of Matchett's Meadow SNCI	Surrey Heath Borough Council	Mixed woodland, grassland. Secondary woodland which has developed on former heathland.	580m south
Matchett's Meadow SNCI	Surrey Heath Borough Council	Unimproved and semi-improved wet meadows.	640m south
Ralph's Meadow SNCI	Surrey Heath Borough Council	Herb rich acid grassland habitat which supports a population of grayling butterfly (<i>Hipparchia semele</i>)	700m south
Benner Lane Conservation Verge	Surrey Heath Borough Council	Population of county significance of common toad (<i>Bufo bufo</i>). Surrey County Council registered toad crossing site number 19.	825m southeast
West End Churchyard SNCI	Surrey Heath Borough Council	Unimproved grassland habitat supporting at least 19 species typical of grassland of conservation interest.	625m south
Burnt Pollard Lane Meadows SNCI	Surrey Heath Borough Council	Unimproved wet meadows. Twenty-five species typical of grassland of conservation interest in Surrey have been recorded.	30m north
Manor Farm Wood SNCI	Surrey Heath Borough Council	Over 5ha of ancient semi-natural woodland.	190m north
Halebourne Copse and Fields SNCI	Surrey Heath Borough Council	Over 5ha of ancient semi-natural woodland.	1m north
Valley End Churchyard SNCI	Surrey Heath Borough Council	Species rich grassland with an interesting mix of species.	890m northwest
Chobham Common SNCI	Surrey Heath Borough Council	Heathland and acid grassland. Secondary woodland with a good potential for heathland restoration.	750m northwest
Chobham Place Woodland SNCI	Surrey Heath Borough Council	Woodland (part ancient semi-natural).	15m northwest



Non-statutory Designated Site (Ordered South to North)	Local Authority	Criteria for Designation	Approximate Distance and Location Relative to Project
Chobham Place Grassland SNCI	Surrey Heath Borough Council	Unimproved meadows.	1m northwest
Chobham Place Woods SNCI	Surrey Heath Borough Council	Mixed secondary woodland. Selected for its old trees, providing potential habitats for invertebrates & birds. The site is an integral part of a larger ecological unit. Hobby, stock dove and all three species of woodpecker have been recorded breeding.	410m north
Burrow Hill Green SNCI	Surrey Heath Borough Council	Acid grassland and small area of heath.	525m south
Little Heath SNCI	Surrey Heath Borough Council	Heath and acid grassland habitats. Fifteen plant species typical of grassland of conservation interest have been recorded. The site's position 0.2km from Chobham Common SSSI may be important for outlying populations of birds and invertebrates.	920m south
Monk's Walk North & West (incl. M3 Exchange Land) SNCI	Surrey Heath Borough Council	Wet woodland, heath, wetland.	Within Order Limits
Longcross Churchyard SNCI	Runnymede Borough Council	Unimproved acid grassland.	590m north
Queenwood Golf Course SNCI	Runnymede Borough Council	Ancient semi-natural woodland, heath, grassland, ponds.	770m south
Fan Grove SNCI	Runnymede Borough Council	Ancient semi-natural woodland	190m north
Hardwick Court Farm Fields SNCI	Runnymede Borough Council	Semi-improved mesotrophic grassland	25m south
Spinney Wood SNCI	Runnymede Borough Council	Ancient semi-natural woodland	960m south
Section G			
Simplemarsh Farm SNCI	Runnymede Borough Council	Important area for birds	30m south
Pannells Farm SNCI	Runnymede Borough Council	Wet grassland, pond	Within Order Limits
Woburn Park Stream SNCI	Runnymede Borough Council	River (length 0.8km)	420m southeast
Chertsey Bourne at Chertsey Meads SNCI	Runnymede Borough Council	River (length 2.1km)	Within Order Limits
Chertsey Meads SNCI	Runnymede Borough Council	Calcareous grassland	Within Order Limits



Non-statutory Designated Site (Ordered South to North)	Local Authority	Criteria for Designation	Approximate Distance and Location Relative to Project
Laleham Burway Golf Course SNCI	Runnymede Borough Council	Semi-improved & unimproved grassland	800m west
River Thames SNCI	Runnymede Borough Council	River (length 15.9km)	Within Order Limits
River Thames - Runnymede SNCI	Runnymede Borough Council	River	Within Order Limits
River Thames - County boundary to Sunbury (boundary with London Borough of Richmond) SNCI	Spelthorne Borough Council	River Thames which falls within top 10% of UK watercourses due to macroinvertebrate diversity (1996). Supports eel (<i>Anguilla anguilla</i>), salmon (<i>Salmo salar</i>), sea trout (<i>Salmo trutta</i>), depressed river mussel (<i>Pseudanodonta complanata</i>) and otter.	Within Order Limits
Land West of Littleton Lane SNCI / Shepperton Quarry SNCI	Spelthorne Borough Council	Two large bodies bordering the River Thames bisected by M3. Important for wintering wildfowl.	Within Order Limits
Charlton Quarry SNCI / Land East of Sheep Walk SNCI	Spelthorne Borough Council	Eutrophic lake with grass margins and numerous willows.	920m east
Section H			
Sheep Walk Lake SNCI	Spelthorne Borough Council	Wetland supporting bird assemblages of county importance for both wintering and summer breeding birds.	355m east
Littleton Lake SNCI	Spelthorne Borough Council	Approximately 30-year old gravel working with mature stands of willow and scrub around lake.	15m east
Chertsey Water Works - Well Field SNCI	Runnymede Borough Council	Neutral grassland.	780m west
West of Queen Mary Reservoir SNCI	Spelthorne Borough Council	Selected for its importance to wildfowl and visiting seabirds.	Within Order Limits
Queen Mary Reservoir SNCI	Spelthorne Borough Council	Selected for its importance to wildfowl and visiting seabirds.	310m west
Shortwood Common North SNCI	Spelthorne Borough Council	Selected as a remnant of an important alluvial grassland contiguous to Shortwood Common SSSI.	645m west
Land adjoining Shortwood Farm SNCI	Spelthorne Borough Council	Undefined.	510m west
Princes Lake SNCI	Spelthorne Borough Council	Large body of standing water with bare ground, tall grass, scrub and dense willows.	Within Order Limits

Table 7.10: Non-statutory Designated Sites Within 1km of the Order Limits – Greater London

Non-statutory Designated Site (Ordered South to North)	Local Authority	Criteria for Designation	Approximate Distance and Location Relative to Project
Section H			
Bedfont Lakes Country Park SMI	Hounslow London Borough Council	A restored gravel extraction and land-fill site, now managed as a country park. Of considerable ornithological interest. Water voles have recently been introduced.	420m east
Mayfield Farm and the Water Treatment Works SBI	Hounslow London Borough Council	A complex of natural and manmade habitats which include one of the largest reedbeds in Hounslow (approximately 3ha in size), open water reservoirs, wetland communities, herb rich grasslands and species rich ponds.	160m east

7.3.11 Based on their designation, all identified non-statutory sites are valued as medium. However, following detailed botanical survey of those non-statutory designated sites within the Order Limits and a review of citation and designation criteria (see Appendix 7.1 Habitats and Botany Factual Report), the valuation of two non-statutory sites have been revised to high. These sites are described below.

Brockwood Copse and Roadside Strips SINC (Section A)

7.3.12 As the Brockwood Copse and Roadside Strips SINC is designated for supporting Ancient Woodland (HBIC, undated), the site is considered of high biodiversity value.

Water Lane SINC (Section A)

7.3.13 As the Water Lane SINC is designated for supporting Ancient Woodland (HBIC, undated), the site is considered of high biodiversity value.

Habitats

7.3.14 The Order Limits encompass an area of approximately 425ha. Baseline information on the habitats within the Order Limits has been gathered from desk study and field surveys comprising habitat, botanical, and hedgerow surveys.

7.3.15 Habitats have been classified and recorded in a variety of ways, as detailed in Appendix 7.1 Habitats and Botany Factual Report. Phase 1 habitats (JNCC, 2010), 'Priority Habitats' (i.e. habitats listed on Section 41 of the NERC Act 2006 that are of principal importance for the purpose of conserving biodiversity in England), Annex I habitats (i.e. those listed on Annex I of the Habitats Directive that require to be maintained at a favourable conservation status) and Ancient Woodland along the route are described below. These habitats have varying degrees of value as summarised below in 7.3.56 – 7.3.61. Habitats within the Order Limits are summarised in Table 7.11.

7.3.16 Survey results are provided in:

- Figure 7.3 Ancient Woodland and Priority Habitats;
- Figure 7.4 Phase 1 habitat survey;

- Appendix 7.1 Habitats and Botany Factual Report;
- Appendix 7.2 Hedgerow Factual report;
- Appendix 7.3 Ancient Woodland Factual Report; and
- Appendix 7.5 Aquatic Ecology Factual Report (which details watercourse habitats).

7.3.17 Approximately 250 hedgerows are crossed by the Order Limits. Of these, 146 are categorised as important and 21 as likely important (where survey constraints existed) under the wildlife and landscape criteria set out in the Hedgerows Regulations 1997 (see Figure 7.4). There are 85 watercourses crossed by the Order Limits, although approximately 41 of these are minor field drains.

Table 7.11: Areas of Phase 1, Priority and Annex I Habitats Identified Within the Order Limits (hedgerow habitat measurements are presented in metres)

Habitat		Approximate Area Within Order Limits (ha)
<i>Annex I Habitats Marked with an Asterisk (*) are Priority Annex I Habitats</i>		
Phase 1 habitat	A1.1.1 - Broadleaved woodland - semi-natural	35.83
	A1.1.2 - Broadleaved woodland - plantation	1.77
	A1.2.2 - Coniferous woodland - plantation	15.63
	A1.3.2 - Mixed woodland - plantation	2.63
	A2.1 - Scrub - dense/continuous	5.77
	A3.1 - Broadleaved Parkland/scattered trees	0.02
	B1.1 - Acid grassland - unimproved	2.69
	B1.2 - Acid grassland - semi-improved	0.14
	B2.1 - Neutral grassland - unimproved	1.73
	B2.2 - Neutral grassland - semi-improved	1.94
	B4 - Improved grassland	87.33
	B5 - Marsh/marshy grassland	2.10
	B6 - Poor semi-improved grassland	15.00
	C1.1 - Bracken - continuous	2.26
	C1.2 - Bracken - scattered	0.12
	C3.1 - Other tall herb and fern - ruderal	2.05
	C3.1 - Other tall herb and fern - non-ruderal	0.26
	D1.1 - Dry dwarf shrub heath - acid	7.64
	D2 - Wet dwarf shrub heath	1.68
	E3.1 - Fen - valley mire	0.11
	F1 - Swamp	0.45
	F2.2 - Marginal and inundation - inundation vegetation	0.09
	G1.1 - Standing water - eutrophic	0.16
	G1.2 - Standing water - mesotrophic	0.08
G1.3 - Standing water - oligotrophic	0.01	
G1.4 - Standing water - dystrophic	0.01	
J1.1 - Cultivated/disturbed land - arable	145.12	

Habitat		Approximate Area Within Order Limits (ha)
<i>Annex I Habitats Marked with an Asterisk (*) are Priority Annex I Habitats</i>		
	J1.2 - Cultivated/disturbed land - amenity grassland	45.77
	J1.3 - Cultivated/disturbed land - ephemeral/short perennial	0.66
	J1.4 - Introduced shrub	0.47
	J3.6 - Buildings	19.43
	J4 - Bare ground	26.09
Total		425.04ha
Priority Habitat	Coastal and Floodplain Grazing Marsh	3.50
	Eutrophic Standing Waters	0.09
	Hedgerows	8,100m
	Lowland Dry Acid Grassland	2.69
	Lowland Fens	0.11
	Lowland Heathland	9.47
	Lowland Meadows	0.91
	Lowland Mixed Deciduous Woodland	28.62
	Ponds	0.03
	Purple Moor-grass and Rush Pastures	1.29
	Reedbeds	0.32
	Rivers	0.24
	Wet Woodland	5.07
Annex I habitat	H4010 Northern Atlantic wet heaths with <i>Erica tetralix</i>	1.70
	H4030 European dry heaths	7.71
	H7150 Depressions on peat substrates of the <i>Rhynchosporion</i>	0.14
	H9190 Old acidophilous oak woods with <i>Quercus robur</i> on sandy plains	3.45
	H91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)	0.93
Ancient Woodland Inventory sites		0
Potential Ancient Woodland Sites (less than 2ha)		0.51

Section A - Boorley Green to Bramdean

- 7.3.18 This section of the route largely comprises artificial habitats associated with agriculture, such as arable fields and improved grassland (Figure 7.4). Semi-natural habitats within the Order Limits comprise small stands of marshy and unimproved neutral grassland, hedgerows bounding fields and small stands of broadleaved semi-natural woodland. Other than Hedgerows Priority Habitat which is frequent along Section A of the route, Priority Habitats along this section are localised.
- 7.3.19 The valley of the Ford Lake Stream at the southwestern end of the Section A supports a variety of Priority and Annex I habitats. The watercourse itself is crossed by the Order Limits (watercourse crossing reference WCX002a) and is of high structural diversity comprising riffle, runs, pools and glides upon a silt/clay, gravel, cobble and pebble substrate. The location comprises the Botley Golf Course Wood SINC, Maddoxford Farm Meadows SINC, Ford Lake Meadow SINC, Ford Lake



Woodland SINC and undesignated areas. Priority Habitats present comprise Coastal and Floodplain Grazing Marsh, Lowland Mixed Deciduous Woodland, Purple Moor-grass and Rush Pastures and Wet Woodland (Figure 7.3).

- 7.3.20 Annex I habitat in the Ford Valley comprises 'Old acidophilous oak woods with *Quercus robur* on sandy plains' and 'Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)' (Figure A7.1.5 in Appendix 7.1 Habitats and Botany Factual Report). Very small areas of any of these habitats are within the Order Limits at this location: approximately 0.21ha and 0.4ha, respectively.
- 7.3.21 The Order Limits cross two tributaries of the River Hamble; WCX006 of high ecological sensitivity (Appendix 7.5 Aquatic Ecology Factual Report) and WCX007 of moderate ecological sensitivity, to the north of Ford Lake Valley. Both tributaries have notable riverine features (i.e. glides) upon silt/clay and gravel substrates while WCX006 also supports good macrophyte cover.
- 7.3.22 To the northeast along the route, there is Purple Moor-grass and Rush Pastures Priority Habitat within the Order Limits, at a non-designated site to the east of Durley (Figure A7.1.17 in Appendix 7.1 Habitats and Botany Factual Report). A non-designated area at Wintershill also supports Coastal and Floodplain Grazing Marsh Priority Habitat within the Order Limits (Figure A7.1.26 in Appendix 7.1 Habitats and Botany Factual Report).
- 7.3.23 To the northeast along the route, Stephen's Castle Down (East) SINC supports the Priority Habitat Lowland Calcareous Grassland and the Annex I habitat 'Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*)' (Figure A7.1.33 in Appendix 7.1 Habitats and Botany Factual Report). These habitats are not within the Order Limits. A small area of Lowland Meadows Priority Habitat, comprising unimproved neutral grassland, is present at the edge of arable land to the west of the SINC, approximately 0.08ha within the Order Limits.
- 7.3.24 At the northeastern end of Section A, the Order Limits include a small area of Lowland Mixed Deciduous Woodland Priority Habitat within Brockwood Copse and Roadside Strips SINC (Figure A7.1.43 in Appendix 7.1 Habitats and Botany Factual Report).
- 7.3.25 There are no Ancient Woodland Inventory (AWI) sites within Section A of the Order Limits. However, there are five AWI sites within 50m of the Order Limits in Section A, totalling approximately 20.3ha (see Figure 7.3). There are an additional eight areas of woodland: three within the Order Limits and five within 50m of the Order Limits which have been identified as Potential Ancient Woodland Sites (less than 2ha). The three sites within the Order Limits comprise: Woodland at Ford Lake (AW2) that would be crossed by trenchless techniques (TC001); a site included for mitigation purposes only (AW4a); and the roadside strips of Brockwood Copse and Roadside Strips SINC (AW7).

Section B – Bramdean to South of Alton

- 7.3.26 This section of the route largely comprises artificial habitats associated with agriculture, such as arable fields and improved grassland (Figure 7.4). Semi-natural



habitats within the Order Limits comprise hedgerows and broadleaved semi-natural woodland. Hedgerows Priority Habitat is frequent along Section B and there are stands of Lowland Mixed Deciduous Woodland Priority Habitat within the Order Limits (Figure 7.3). No further Priority Habitats have been identified within this section.

- 7.3.27 The Order Limits cross the unnamed watercourse WCX010 (Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report) which was dry at the time of survey.
- 7.3.28 Section B of the Order Limits does not include any AWI sites or any Potential Ancient Woodland Sites (less than 2ha). A single AWI site is located immediately adjacent to the Order Limits (Figure 7.3) where the Order Limits have been extended to include hedgerow planting linked to the AWI site (Figure 7.5) – no installation works would take place in this area. Eight AWI sites are located within 50m of the Order Limits in Section B totalling approximately 3.17ha. No Potential Ancient Woodland Sites (less than 2ha) were identified within 50m of the Section B Order Limits.

Section C – South of Alton to Crondall

- 7.3.29 This section of the route largely comprises artificial habitats associated with agriculture, such as arable fields and improved grassland (Figure 7.4). Semi-natural habitats within the Order Limits comprise hedgerows and broadleaved semi-natural woodland. Hedgerows Priority Habitat is frequent, and there are small stands of Lowland Mixed Deciduous Woodland Priority Habitat within the Order Limits (Figure 7.3).
- 7.3.30 The Order Limits cross the River Wey (WCX0019) (Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report) near Alton, which is of high ecological sensitivity due to its chalk stream character, heterogenous structure comprising riffles, runs, pools and glides over a sand and gravel substrate. Drainage ditches with low ecological sensitivity (WCX020 and WCX021) would also be crossed by the Order Limits.
- 7.3.31 Areas of floodplain adjacent to the Caker Stream (WCX012 – dry at time of survey) and River Wey, including within the Order Limits, support habitats identified by a desk study as Coastal and Floodplain Grazing Marsh Priority Habitat (Figure 7.3). However, botanical surveys of these habitats show that these areas comprise improved grassland (Figure 7.3). No further Priority Habitats have been identified within this section.
- 7.3.32 Section C of the Order Limits does not include any AWI sites. Two AWI sites are located within 50m of the Order Limits totalling approximately 0.29ha. There are four Potential Ancient Woodland Sites (less than 2ha) within 50m of the Order Limits, two of these intersect with the Order Limits (Figure 7.3) and comprise a component of Water Lane SINC (AW41) and a connective hedgerow to Monk Woods SINC (AW12).

Section D – Crondall to Farnborough

- 7.3.33 The southern third of Section D, from Crondall to the B3013 at Crookham Park, largely comprises improved grassland and built-up areas, with extensive stands of



broadleaved semi-natural woodland nearby (Figure 7.4). The Order Limits pass through the western part of Ewshot Meadows SINC, which the desk study suggested was unimproved neutral grassland. However, the results of botanical surveys show that this grassland is of poor quality due to lack of management (Appendix 7.1 Habitats and Botany Factual Report).

- 7.3.34 To the north, Section D runs through the large open areas of Tweseldown Racecourse and open heathland and afforested former heathland within Bourley and Long Valley SSSI (Figure 7.3). The racecourse is dominated by amenity grassland. At this location, Bourley and Long Valley SSSI is dominated by coniferous plantation woodland but there are smaller yet extensive open areas of heathland habitats adjacent to the Order Limits. These habitats comprise Lowland Heathland Priority Habitat (Figure A7.1.94 in Appendix 7.1 Habitats and Botany Factual Report), including the Annex I habitats 'European dry heaths' and 'Northern Atlantic wet heaths with *Erica tetralix*', smaller areas of Lowland Dry Acid Grassland and Lowland Fens Priority Habitats. The latter Priority Habitat includes the Annex I habitat 'Depressions on peat substrates of the *Rhynchosporion*'. This area also supports stands of broadleaved semi-natural woodland comprising the Annex I habitat 'Old acidophilous oak woods with *Quercus robur* on sandy plains' (Figure A7.1.96 in Appendix 7.1 Habitats and Botany Factual Report).
- 7.3.35 The Gelvert Stream (WCX040, see Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report) runs through the Order Limits within Bourley and Long Valley SSSI but was dry at the time of survey. East of the SSSI, the Order Limits cross the Basingstoke Canal SSSI (WCX041).
- 7.3.36 The northern third of Section D is through the Cody Technology Park and the western part of the former Southwood Golf Course (Figure 7.4). There are small areas of semi-natural habitats to the north of Cody Technology Park, comprising the Priority Habitats Lowland Dry Acid Grassland, Lowland Meadows and Lowland Mixed Deciduous Woodland, and the Annex I habitat 'Old acidophilous oak woods with *Quercus robur* on sandy plains' (see Figures A7.1.102 and A7.1.103 in Appendix 7.1 Habitats and Botany Factual Report). The former golf course largely comprises amenity grassland, with peripheral stands of broadleaved semi-natural grassland, including Lowland Mixed Deciduous Woodland and Wet Woodland Priority Habitats. These include the Annex I habitats 'Old acidophilous oak woods with *Quercus robur* on sandy plains' and 'Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)', respectively (see Figures A7.1.109 and A7.1.110 in Appendix 7.1 Habitats and Botany Factual Report).
- 7.3.37 There are no AWI sites within Section D of the Order Limits. Four AWIs are located within 50m of the Order Limits in Section D totalling approximately 2.74ha. There are five Potential Ancient Woodland Sites (less than 2ha) within 50m of the Order Limits (Figure 7.3). One of these is located within the Order Limits (AW15a) west of Ewshot Wood SINC.

Section E – Farnborough to Bisley and Pirbright Ranges

- 7.3.38 This section of the route is predominantly urban, with the Order Limits crossing areas of semi-natural habitat at Cove Brook, Queen Elizabeth Park, the valley of the River Blackwater at Frimley Green, and through Frith Hill (Figure 7.4).
- 7.3.39 The valley of the Cove Brook, including Cove Brook Grassland SINCC and Cove Valley, Southern Grassland SINCC, supports Coastal and Floodplain Grazing Marsh, Lowland Mixed Deciduous Woodland and Wet Woodland Priority Habitats (Figure 7.3). The Cove Brook (WCX048c – Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report) is of moderate habitat sensitivity comprising a silt/clay and cobble substrate but with unclear water flow and limited macrophyte presence. A tributary to the immediate west (Ively Brook - WCX047) is of low sensitivity (Appendix 7.5 Aquatic Ecology Factual Report). Queen Elizabeth Park supports a stand of secondary broadleaved semi-natural woodland constituting Lowland Mixed Deciduous Woodland Priority Habitat, and open areas of amenity grassland (Figure 7.4) (see also Figures A7.1.116 and A7.1.122 in Appendix 7.1 Habitats and Botany Factual Report for drawings of relevance to this area).
- 7.3.40 The valley of the River Blackwater (WCX051) within the Order Limits supports dry dwarf shrub heath, swamp and broadleaved semi-natural woodland (Figure A7.1.128 in Appendix 7.1 Habitats and Botany Factual Report). Dwarf shrub heath constitutes Lowland Heathland Priority Habitat and the Annex I habitat ‘European dry heaths’, and broadleaved semi-natural woodland includes Lowland Mixed Deciduous Woodland and Wet Woodland Priority Habitats (Figure 7.3). Lowland Mixed Deciduous Woodland includes peripheral stands of the Annex I habitat ‘Old acidophilous oak woods with *Quercus robur* on sandy plains’. More extensive stands of Wet Woodland Priority Habitat with alder (*Alnus glutinosa*) constitute the Annex I habitat ‘Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)’. The area of swamp crossed by the Order Limits constitutes Reedbeds Priority Habitat (Figures A7.1.129 and A7.1.130 in Appendix 7.1 Habitats and Botany Factual Report). The River Blackwater is of moderate habitat sensitivity (Appendix 7.5 Aquatic Ecology Factual Report) supporting glides present over silt/clay, gravel and cobble substrate but with limited macrophyte cover. An unnamed watercourse (a tributary of the River Blackwater at Burrow Hill, Farnborough) is located to the east of the River Blackwater but was dry at the time of survey.
- 7.3.41 The Frith Hill area of Section E is dominated by plantation woodland and the Pine Ridge Golf Course, largely comprising plantation woodland and amenity grassland (Figure 7.4). The forestry area includes the Frith Hill SNCC and Frimley Fuel Allotments SNCC (Figure 7.2), and to the west is the St Catherine’s SANG. Within the Order Limits, there are small stands (approximately 0.26ha) of Lowland Dry Acid Grassland Priority Habitat along forestry tracks (see Figure A7.1.140 in Appendix 7.1 Habitats and Botany Factual Report), and an area of unimproved neutral grassland created as part of the SANG site.
- 7.3.42 There are no AWI sites within or within 50m of the Section E Order Limits. There are two Potential Ancient Woodland Sites (less than 2ha) within 50m of the Order Limits (AW18 and AW20 – Figure 7.3).

Section F – Bisley and Pirbright Ranges to M25

- 7.3.43 This section of the route crosses extensive areas of semi-natural habitat within the Colony Bog and Bagshot Heath SSSI and Chobham Common SSSI/NNR (Figure 7.1). These sites support extensive areas of Lowland Heathland Priority Habitat, including the Annex I habitats ‘European dry heaths’ and ‘Northern Atlantic wet heaths with *Erica tetralix*’, and smaller areas of Lowland Dry Acid Grassland and Lowland Fens Priority Habitats (Figure 7.3). The latter Priority Habitat includes the Annex I habitat ‘Depressions on peat substrates of the *Rhynchosporion*’. These Annex I habitats are qualifying features of the Thursley, Ash, Pirbright and Chobham SAC, of which the SSSIs are component sites. Both SSSIs also support Lowland Mixed Deciduous Woodland Priority Habitat, which includes the Annex I habitat ‘Old acidophilous oak woods with *Quercus robur* on sandy plains’, and Ponds, Purple Moor-grass and Rush Pastures and Wet Woodland Priority Habitats. Interaction between the Order Limits and these habitats is largely confined to the Annex I habitat ‘European dry heaths’ within these SSSIs (see Figures A7.1.149 and A7.1.165 in Appendix 7.1 Habitats and Botany Factual Report).
- 7.3.44 Elsewhere within Section F, semi-natural habitats are fragmented, and the Order Limits largely comprise modified or artificial habitats (Figure 7.4). To the east of Colony Bog and Bagshot Heath SSSI, the route crosses the River Halebourne (WCX066), a watercourse of high sensitivity (Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report) with glides over gravel, silt/clay and pebble substrate, woody debris and abundant macrophytes. The Order Limits also cross a tributary of the River Halebourne (WCX068) in two locations. Surrounding terrestrial habitats comprise improved grassland with small areas of broadleaved semi-natural woodland within and around the Order Limits, comprising Lowland Mixed Deciduous Woodland and Wet Woodland (Figure A7.1.155 in Appendix 7.1 Habitats and Botany Factual Report). The latter include the Annex I habitat ‘Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)’, respectively (Figure A7.1.156 in Appendix 7.1 Habitats and Botany Factual Report). Clappers Brook (WCX070) is further to the east and an unnamed watercourse (WCX073) within Chobham Common are also crossed by the Order Limits that are of low ecological habitat sensitivity (Appendix 7.5 Aquatic Ecology Factual Report).
- 7.3.45 To the east of Chobham Common SSSI/NNR, the Foxhills Golf Course also supports fragments of semi-natural habitats, within an area largely dominated by amenity grassland and other landscaped features (Figure 7.4). Also within the Order Limits here are stands of broadleaved semi-natural woodland comprising Lowland Mixed Deciduous Woodland, including the Annex I habitats ‘Old acidophilous oak woods with *Quercus robur* on sandy plains’ (Figures A7.1.170 and A7.1.171 in Appendix 7.1 Habitats and Botany Factual Report).
- 7.3.46 No AWIs are located within Section F of the Order Limits. Two AWIs are located within 50m of the Order Limits in this section totalling approximately 2.19ha (Figure 7.3).
- 7.3.47 A Potential Ancient Woodland Site (less than 2ha) (AW30) was identified in the Order Limits on the eastern boundary of Fox Hills Golf Course. An additional three



Potential Ancient Woodland Sites (less than 2ha) are located within 50m of the Order Limits: AW28, AW29 and AW31 (Figure 7.3).

Section G – M25 to M3

- 7.3.48 This section crosses largely open areas to the west and northeast of Addlestone, including part of Pannells Farm SNCI, the Chertsey Bourne (WCX095), a large open area of Chertsey Meads SNCI/LNR, the River Thames (WCX096) and a small area (<0.04ha) in the east of Dumsey Meadow SSSI (Figure 7.1). However, Dumsey Meadows SSSI and River Thames would be avoided through the use of trenchless construction techniques (TC034).
- 7.3.49 Just to the east of the M25 crossing, the Order Limits comprise an area of former pasture supporting semi-improved grassland, dense scrub and secondary broadleaved semi-natural woodland (Figure 7.4). The Order Limits within Pannells Farm SNCI comprise small paddocks supporting poor semi-improved grassland with boundary hedgerows. Part of the SNCI includes a larger area of Wet Woodland Priority Habitat to the east, within the Order Limits, constituting the Annex I habitat 'Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)' (Figures A7.1.177 and A7.1.178 in Appendix 7.1 Habitats and Botany Factual Report).
- 7.3.50 The Order Limits within Chertsey Meads largely comprise improved grassland, with small areas of semi-improved and unimproved neutral grassland, constituting Lowland Meadows Priority Habitat (Figure 7.3), and broadleaved semi-natural woodland. The trenchless crossing (TC034) also includes Wet Woodland Priority Habitat on the bank of the River Thames (Figure A7.1.184 in Appendix 7.1 Habitats and Botany Factual Report).
- 7.3.51 Chertsey Bourne (WCX095) is a watercourse of moderate habitat sensitivity (Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report) supporting glide features and over a thick silt/clay and cobble substrate. The River Thames (WCX096) is a watercourse of high habitat sensitivity (Appendix 7.5 Aquatic Ecology Factual Report) exhibiting glide features over a sand, silt/clay, gravel and pebble substrate.
- 7.3.52 There are no AWI sites within or within 50m of Section G of the Order Limits. There is one Potential Ancient Woodland Site (less than 2ha) adjacent to the Order Limits (AW35 - Figure 7.3).

Section H – M3 to the Esso West London Terminal Storage Facility

- 7.3.53 This section is through a predominantly urban area. Semi-natural habitats are confined to the edges of flooded former gravel pits, comprising semi-improved neutral grassland and broadleaved semi-natural woodland (Figure 7.4).
- 7.3.54 The Order Limits within Section H cross three waterbodies: the River Ash (WCX100 – Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report), a high sensitivity watercourse (Appendix 7.5 Aquatic Ecology Factual Report); the Intake channel from River Thames to Queen Mary Reservoir (WCX102), a moderate sensitivity watercourse; and Staines Reservoir Aqueduct (WCX104), a low sensitivity



watercourse. However, trenchless construction would avoid direct impact on these watercourses, TC039, TC038 and TC037, respectively.

- 7.3.55 There are no AWI sites within or within 50m of Section H of the Order Limits. There is one Potential Ancient Woodland Site (less than 2ha) adjacent to the Order Limits (AW37a – Figure 7.3). None were identified within the Order Limits.

Value

- 7.3.56 Based on the irreplaceable nature of Ancient Woodland, this habitat is valued as high. This value is also attributed to Potential Ancient Woodland Sites (less than 2ha).
- 7.3.57 Outside of statutory designated sites, Priority Habitats are considered to be of medium value:
- Eutrophic Standing Water;
 - Hedgerows;
 - Lowland Dry Acid Grassland;
 - Lowland Fens;
 - Lowland Heathland;
 - Lowland Mixed Deciduous Woodland;
 - Purple Moor-grass and Rush Pastures;
 - Reedbeds; and
 - Wet Woodland.
- 7.3.58 The Order Limits cross approximately 250 hedgerows (Appendix 7.2 Hedgerow Factual Report) which are of varying ecological value based on their location, age, structure and connectivity. The Order Limits cross approximately 146 hedgerows considered to be Important and 21 that are likely important under the Hedgerows Regulations 1997 relating to wildlife and landscape criteria only. All hedgerows are classified as medium value.
- 7.3.59 Following detailed botanical survey of Priority Habitats within the Order Limits (Appendix 7.1 Habitats and Botany Factual Report) and a review of designation criteria (Biodiversity Reporting and Information Group, 2007), the valuation of some Priority Habitat have been revised to low:
- Wet Woodland at Wintershill (Section A);
 - Lowland Meadows at Betty Mundy's Bottom (Section A);
 - all surveyed Coastal and Floodplain Grazing Marsh due to its highly improved nature (Section A and Section C);
 - Arable Field Margins (Section C);
 - Purple Moor-grass and Rush Pastures at Old Ively Road (Section D);

- Lowland Mixed Deciduous Woodland at Oak Park Golf Course (Section D), Frimley Green (Section E) and Addlestone Moor (Section F); and
- Lowland Dry Acid Grassland at Foxhills Golf Course (Section F).

7.3.60 Habitat not considered Priority Habitat is of negligible value and is not discussed further in the assessment.

7.3.61 Watercourses crossed by the route are assessed in Chapter 8 Water, and in Appendix 8.6 Water Framework Directive Compliance Assessment.

Notable Plant Species

7.3.62 Baseline information on notable plants within the study area has been gathered from field survey and desk study (see Appendix 7.1 Habitats and Botany Factual Report).

7.3.63 Records obtained from HBIC returned a total of 28 notable plant taxa recorded to at least 100m accuracy and intersecting the Order Limits. A further 93 taxa have been recorded from 1km OS grid squares intersecting the Order Limits, including heathland species such as heather (*Calluna vulgaris*) and tormentil (*Potentilla erecta*) not recorded to 100m accuracy.

7.3.64 Thirty-five notable plant taxa were recorded within the Order Limits during field survey, summarised in Table 7.12. Sixteen of these species were recorded outside of designated sites, 19 were recorded within designated sites only.

Heathland Species

7.3.65 The majority of the notable plants recorded were associated with the heathland areas crossed by the Order Limits, and many are frequent to dominant within these sites, for example bristle bent (*Agrostis curtisii*), cross-leaved heath (*Erica tetralix*) and heather (*Calluna vulgaris*). Outside of designated sites, heathland specialist notable plants were recorded but were of England Near Threatened status only.

Arable Weeds

7.3.66 No notable arable weed plant species were recorded in the Order Limits. The desk study identified the presence of spreading hedge-parsley (*Torilis arvensis*) (a Priority Species, Nationally Scarce, and Endangered in Great Britain) in the study area. Two notable species associated with arable habitats were recorded in the wider survey area (meadow brome *Bromus commutatus* and rye brome *B.secalinus*).

7.3.67 Given the baseline conditions, significant effects are not predicted to arise to arable weeds and so this ecological receptor is not discussed further in the assessment.

Floodplain Species

7.3.68 Areas of Coastal Flood Plain and Grazing Marsh were targeted for identification of notable species characteristic with this type of habitat. No notable species were recorded. This ecological receptor is not discussed further in the assessment and significant effects are not predicted to arise given the baseline conditions.

Value

7.3.69 The notable plant species assemblage recorded within the Order Limits and outside of statutory and non-statutory designated sites are valued as low.

Table 7.12: Summary of Notable Plant Taxa Recorded Within the Order Limits During Botanical Surveys and Their Conservation Statuses

Scientific Name	Common Name	Conservation Status	Recorded Outside of Designated Sites
<i>Agrostis curtisii</i>	Bristle bent	North Hampshire Scarce, Surrey Scarce	■
<i>Calluna vulgaris</i>	Heather	England Near Threatened	■
<i>Carex echinata</i>	Star sedge	England Near Threatened	-
<i>Cruciata laevipes</i>	Crosswort	England Near Threatened	-
<i>Cuscuta epithymum</i>	Dodder	Great Britain Vulnerable, England Vulnerable	-
<i>Dactylorhiza maculata</i>	Heath spotted-orchid	Surrey Scarce	-
<i>Drosera rotundifolia</i>	Round-leaved sundew	England Near Threatened	-
<i>Erica cinerea</i>	Bell heather	England Near Threatened	■
<i>Erica tetralix</i>	Cross-leaved heath	England Near Threatened	-
<i>Eriophorum angustifolium</i>	Common cottongrass	England Vulnerable	-
<i>Filago minima</i>	Small cudweed	England Near Threatened	-
<i>Filago vulgaris</i>	Common cudweed	England Near Threatened, Great Britain Near Threatened	■
<i>Fragaria vesca</i>	Wild strawberry	England Near Threatened	■
<i>Melampyrum pratense</i>	Common cow-wheat	England Near Threatened	-
<i>Myrica gale</i>	Bog-myrtle	England Near Threatened, North Hampshire Scarce	-
<i>Nardus stricta</i>	Mat-grass	England Near Threatened	■
<i>Oxalis acetosella</i>	Wood-sorrel	England Near Threatened	-
<i>Pedicularis sylvatica</i>	Lousewort	England Vulnerable	-
<i>Polygala serpyllifolia</i>	Heath milkwort	England Near Threatened	-
<i>Potentilla erecta</i>	Tormentil	England Near Threatened	■
<i>Potentilla x mixta</i>	Hybrid cinquefoil	North Hampshire Rare	-
<i>Pyrola minor</i>	Common wintergreen	England Near Threatened, North Hampshire Scarce, Hampshire Rare, Surrey Scarce, England Near Threatened	-
<i>Ranunculus flammula</i>	Lesser spearwort	England Vulnerable	■
<i>Salix purpurea</i>	Purple willow	Surrey Scarce	-

Scientific Name	Common Name	Conservation Status	Recorded Outside of Designated Sites
<i>Salix repens</i>	Creeping willow	England Near Threatened	-
<i>Sanicula europaea</i>	Sanicle	England Near Threatened	■
<i>Saxifraga granulata</i>	Meadow saxifrage	Surrey Scarce	-
<i>Saxifraga tridactylites</i>	Rue-leaved saxifrage	North Hampshire Scarce	■
<i>Senecio aquaticus</i>	Marsh ragwort	England Near Threatened	■
<i>Silene flos-cuculi</i>	Ragged-robin	England Near Threatened	■
<i>Spergula arvensis</i>	Corn spurrey	Great Britain Vulnerable, England Vulnerable	■
<i>Succisa pratensis</i>	Devil's-bit scabious	England Near Threatened	■
<i>Trichophorum germanicum</i>	Deergrass	North Hampshire Scarce	-
<i>Valeriana officinalis</i>	Common valerian	England Near Threatened	■
<i>Veronica officinalis</i>	Heath speedwell	England Near Threatened	■

Invasive Non-Native Species (INNS) of Plants

- 7.3.70 An invasive non-native species (INNS) is any non-native plant (or animal) that has the ability to spread causing damage to the environment, the economy, human health and wellbeing (Great Britain Non-Native Species Secretariat, 2018).
- 7.3.71 Invasive non-native animal species are not considered within this assessment as the project has extremely limited potential to contribute to their introduction or spread.
- 7.3.72 For the purposes of this assessment, invasive plant species are divided into two groups:
- legally controlled species (listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended); and
 - other INNS that are classified as invasive but not listed on Schedule 9.
- 7.3.73 The desk study identified 13 records of legally controlled species within 1 km of the Order Limits. An additional 31 species of other relevant INNS were identified within 1km of the Order Limits. These are detailed in Appendix 7.4 Invasive Non-Native Plant Species Factual Report and are shown on Figure A7.4.1.
- 7.3.74 The INNS identified during botanical surveys at the locations shown in Appendix 7.4 - Figure A7.4.1 comprised:
- legally controlled INNS: Himalayan balsam (*Impatiens glandulifera*); shallon (*Gaultheria shallon*); Japanese knotweed; Himalayan cotoneaster (*Cotoneaster*

simonsii); wall cotoneaster (*Cotoneaster horizontalis*); Montbretia (*Crocasmia x crocosmiiflora*); New Zealand pigmyweed (*Crassula helmsii*); rhododendron (*Rhododendron ponticum*); and

- other INNS: snowberry (*Symphoricarpos albus*); cherry laurel (*Prunus laurocerasus*); Himalayan giant bramble (*Rubus armeniacus*); butterfly bush (*Buddleja davidii*); Wilson's honeysuckle (*Lonicera nitida*); variegated yellow archangel (*Lamiastrum galeobdolon subsp. Argentatum*); arrow bamboo (*Pseudosasa japonica*); Juneberry (*Amelanchier lamarckii*); Portugal laurel (*Prunus lusitanica*); Japanese rose (*Rosa rugosa*); orange balsam (*Impatiens capensis*); Franchet's cotoneaster (*Cotoneaster franchetii*); steeple-bush (*Spiraea douglasii*); goat's-rue (*Galega officinalis*); and a Michaelmas-daisy (*Aster* sp).

Value

- 7.3.75 As INNS plants do not have any intrinsic biodiversity value they are valued as negligible.

Aquatic Macroinvertebrates

- 7.3.76 Appendix 7.5 Aquatic Ecology Factual Report details the results of the desk study and habitat walkover surveys to identify habitats sensitive to construction activities.

- 7.3.77 White clawed crayfish (*Austropotamobius pallipes*) records were provided for the River Wey, River Thames and River Halebourne. In all instances, these records are over 2km downstream of the Order Limits and the crossing of each watercourse is proposed to be trenchless (TC008, TC034 and TC022 respectively), resulting in no impact pathway to this species.

- 7.3.78 Of the 85 watercourses crossed by the Order Limits Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report), approximately half were minor relic field drains with limited aquatic ecological interest. The following watercourse crossings were identified as having high ecological sensitivity for aquatic invertebrates:

- WCX019 – River Wey (Section C);
- WCX047 – Ively Brook (Section E);
- WCX048 – Cove Brook (Section E);
- WCX051 – River Blackwater (Section E);
- WCX066 – River Halebourne (Section F); and
- WCX095 – Chertsey Bourne (Section G).

- 7.3.79 The tributary of the Halebourne (WCX068) in Section F was identified as having moderate sensitivity for aquatic invertebrates based on species records downstream of the crossing point.

Value

- 7.3.80 Although watercourses with moderate and high sensitivity for aquatic invertebrates would be crossed by the Order Limits, no aquatic macroinvertebrate species of

conservation interest were identified, nor any species with a specific sensitivity to the proposed works. Aquatic macroinvertebrate communities within the Order Limits are therefore considered to be of low value.

Bats

Desk Study

- 7.3.81 Desk study records and a review of core sustenance zones (CSZ) identified at least 13 bat species that are likely to be present within the landscape crossed by the Order Limits: barbastelle (*Barbastella barbastellus*); Bechstein's bat (*Myotis bechsteini*); Brandt's bat (*Myotis brandtii*); whiskered bat (*Myotis mystacinus*); brown long-eared bat (*Plecotus auratus*); common pipistrelle (*Pipistrellus pipistrellus*); Daubenton's bat (*Myotis daubentonii*); Leisler's bat (*Nyctalus leisleri*); Nathusius' pipistrelle (*Pipistrellus nathusii*); Natterer's bat (*Myotis nattereri*); noctule (*Nyctalus noctule*); serotine (*Eptesicus serotinus*); and soprano pipistrelle (*Pipistrellus pygmaeus*). See Figure A7.7.1 in Appendix 7.7 Bat Factual Report for locations of these records.
- 7.3.82 Common and widespread bat species (e.g. common and soprano pipistrelle and brown long-eared bat) comprise the majority of the desk study records. However, the rarer Bechstein's bat and barbastelle have been recorded within the Blackhouse Copse and Joan's Acre Wood woodland complex to the south of Hinton Ampner in Section A. The Order Limits pass immediately east of these woodlands. Based on the location of these records and the CSZ of these species (the CSZ extends for up to 3km for Bechstein's bat and 6km for barbastelle (Collins, 2016)), the Order Limits are likely to intersect with CSZ habitat south of Blackhouse Copse and Joan's Acre Wood including as far as Brockwood Park Farm as indicated by Figure A7.7.1 in Appendix 7.7 Bat Factual Report.
- 7.3.83 None of the bat roost records provided are located within 10m of the Order Limits (where accurate grid references or descriptions were provided). However, several grid squares within which roost records are located do overlap the Order Limits. Most roost records relate to roosts in buildings, none of which would be affected by the project.
- 7.3.84 A search carried out on MAGIC (2018) returned 41 records of bat EPS licences issued by Natural England within 1km of the Order Limits. The species affected included common pipistrelle, soprano pipistrelle, brown long-eared bat, whiskered bat and Natterer's bat. Only one of these records falls within the immediate vicinity of the Order Limits in Section A, at Wolfhanger Farm, West Tisted for common pipistrelle and Natterer's bat in 2014.
- 7.3.85 MAGIC searches confirmed there are no SACs with bat species as a qualifying feature located within 10km of the Order Limits.

Habitat Assessment

- 7.3.86 A desk study was undertaken to value habitat potentially used by commuting and foraging bats. This valuation was based on the quality of habitat for bats around the Order Limits (based on Phase 1 habitats – Figure 7.4), the bat assemblages



identified through desk study records and respective CSZs, and the potential for rare species (i.e. bat species listed on Annex II of the Conservation of Habitats and Species Regulations 2017) to be utilising the habitat.

- 7.3.87 Based on this assessment, likely bat 'hotspots' were identified as detailed in Appendix 7.7 Bat Factual Report. The habitat assessment showed that bat activity would be most prevalent in rural areas with a close association with mature broadleaved woodland, waterbodies and parkland, as well as the hedgerows and other linear habitat features that interconnect these habitats (Collins, 2016).
- 7.3.88 Further details and results of this assessment can be found on figure A7.7.1 of Appendix 7.7 Bat Factual Report.

Field Surveys

Trees

- 7.3.89 The aim of the survey work was to identify the locations where there is a high risk of bat presence. These results informed the alignment of the Order Limits, Limits of Deviation, and the requirement for any location-specific mitigation commitments to reduce the risk and/or impact to bats, especially rarer species (refer to Chapter 4 Design Evolution and Chapter 16 Environmental Management and Mitigation for more information).
- 7.3.90 Preliminary ground level tree assessments of approximately 1,300 trees were undertaken during 2018 and 2019 to inform the project's design and impact assessment.
- 7.3.91 Of the 582 trees assessed within 10m of the Order Limits: three bat roosts were confirmed (low number of common pipistrelle at two roosts, and an unconfirmed species at the third roost); 121 trees were classified as having high potential for bat roosts; and 335 trees were classified as having moderate potential for bat roosts (see Figure A7.7.2 in Appendix 7.7 Bat Factual Report). The remaining trees had low or negligible potential to support roosts. Full survey data are provided in Appendix 7.7 Bat Factual Report.

Structures

- 7.3.92 Several garages within the Order Limits at Stakes Lane, Farnborough (Figure A7.7.2, Appendix 7.7 Bat Factual Report) would require demolition as part of the project. A ground-based roost assessment for bat roosting potential of these structures identified low potential for roosting bats with no features present available for supporting long-term or significant roosts.

Value

- 7.3.93 Bats are mobile animals and are highly likely to forage or commute within or across the Order Limits. There are many trees within the Order Limits that have potential to support bat roosts. The bat species recorded by the desk study have varying sensitivities and conservation status. Similarly, not all locations within the Order Limits are of equal importance for bats, with areas dominated by urban or intensively



managed agricultural land-use being of lower value than landscapes supporting plentiful Ancient Woodland and large hedgerows. However, due to the species composition of bats recorded within the study area and the potential for roosts to be present within the Order Limits, all bats are valued as high.

Breeding Birds

- 7.3.94 HBIC, GiGL and 2Js Ecology (2Js, 2018) provided records of 111 bird species from within a 1km search area between 2008 and 2018 (Appendix 7.8 Bird Factual Report). One-hundred and two species were notable i.e. had increased levels of legal protection, had associated Local BAPs, were Priority Species or were listed as red or amber in Birds of Conservation Concern 4th edition (Eaton *et al.*, 2015). However, the breeding status of these species could not be confirmed in all records and some of these records would relate to wintering or non-breeding birds. It can therefore be reasonably assumed that the number of breeding bird species within the study area is considerably lower.
- 7.3.95 Sixteen statutory and 11 non-statutory designated sites notified for their bird interest are located within 1km of the Order Limits (Appendix 7.8 Bird Factual Report). Designated sites that have breeding birds as an interest feature and are crossed by the Order Limits comprise:
- Thames Basin Heaths SPA and associated SSSI: Bourley and Long Valley SSSI, Colony Bog and Bagshot Heath SSSI, and Chobham Common SSSI/NNR.
 - Basingstoke Canal SSSI (birds are mentioned in the citation but are not a reason for designation); and
 - Chertsey Meads LNR.
- 7.3.96 Outside of designated sites, it is considered that the overwhelming majority of breeding birds using habitats within or adjacent to the Order Limits will be common and widespread. These bird species could be present in almost all habitats within the Order Limits. In general terms, the most important habitats for breeding birds are considered to be hedgerows, woodland, scrub and rough grassland, although breeding birds will also be found in arable land and grazed pasture.
- 7.3.97 The southern half of the route, up to and including the southern half of Section D, comprises an agricultural landscape which provides breeding habitat for a range of bird species. Further north, the route is characterised by increased development with more limited breeding bird potential, interspersed with designated sites (e.g. the Thames Basin Heaths SPA) which support a large diversity of bird species (Sections F to H).
- 7.3.98 Outside designated sites, breeding birds are expected to be abundant due to the wide range of habitats available within the local landscape. As such, breeding birds outside of statutory designated sites are valued as low.

Dormouse

Desk Study

- 7.3.99 HBIC returned five dormouse records from the last ten years (2008 – 2018) from within the 1km study area (Figure A7.9.1 in Appendix 7.9 Dormouse Factual Report). Over 50 records of dormouse were identified from open source data sources and a search carried out on MAGIC.

Habitat Assessment

- 7.3.100 Dormice are common in Hampshire and Surrey (PTES, undated) and are considered likely to be present within all suitable habitats (i.e. woodland, scrub and hedgerows) with well-established connectivity to the wider landscape. This would almost certainly be the case in areas with recorded dormouse presence and where woodland (especially Ancient Woodland or large blocks of woodland (i.e. >50ha)) is prevalent in the local landscape (Harris and Yalden, 2008).
- 7.3.101 A comprehensive account of the distribution and status of dormice in Hampshire was produced in 2003 and revealed that dormice occupancy was nearing 70% of woodland sites within the county (McFadyn *et al.*, 2004).
- 7.3.102 Dormice are unlikely to be present in Section H between the M25 and the Esso West London Terminal storage facility, due to fragmentation of habitats caused by urban areas and major road and railway infrastructure.
- 7.3.103 As such, it has been assumed that dormice are currently present in all suitable habitats where the results of the data search confirm the historic presence of dormice at these locations. Dormouse presence has also been assumed in more distant habitats with direct, well-established and unbroken connectivity to locations with confirmed historic dormouse records (Harris and Yalden, 2008).

Presence/Likely Absence Surveys

- 7.3.104 Field surveys were undertaken where the results of a desk study alone were not sufficient to confirm dormouse presence or likely absence. Twelve 'Sites' (each Site comprised a number of smaller survey areas, such as individual hedgerows or woodlands) were surveyed to confirm the presence or likely absence of dormouse (see Appendix 7.9 Dormouse Factual Report for full details).
- 7.3.105 A total of eight dormice were found and 24 nests identified during the survey. There were also records of dormice feeding remains (gnawed nuts) made incidentally. The locations of all records are shown on figure A7.9.1 of Appendix 7.9 Dormouse Factual Report.
- 7.3.106 The results from the desk study data search and field surveys have confirmed the presence of dormice within hedgerow and woodland habitats at nine of the 16 survey sites (Sites 1, 2, 3, 4, 5, 6, 7, 12 and 13). Site 9 could not be accessed throughout 2018, and so dormice are assumed present at this Site due to the presence of suitable habitat. All of these sites are in Sections A to D.



7.3.107 Likely dormouse absence has been confirmed at Sites 8, 10, 11, 14, 15 and 16 (Sections E to F). It can be reasonably assumed that dormice are not present in Sections E, F, G and H of the project. These sections largely comprise heathland habitats and urban areas which are sub-optimal for dormouse.

Value

7.3.108 Hampshire and Surrey are strongholds for dormice. However, the species is nationally rare and vulnerable to extinction. Dormouse populations continue to decline in number and range, with the threat to their survival primarily due to loss and degradation of suitable habitat.

7.3.109 The wider landscape surrounding the Order Limits supports a large amount of optimal dormouse habitat, including hedgerows and broadleaved woodland (much of which is ancient in origin). The suitable dormouse habitat within the Order Limits is typically well connected to these wider landscape habitats by hedgerows and lines of trees.

7.3.110 The population recorded by the surveys is spread over a wide geographical area and is not focussed on a specific location. The results do not suggest that any one site is of high conservation value for dormice. As such, the results are considered to be representative of the known dormouse population status in Hampshire and Surrey.

7.3.111 Given the above, the estimated dormouse population within the Order Limits is not considered to be of high value at the local, regional or national scales.

7.3.112 Taking account of the regional abundance of dormouse within suitable habitats, this species is valued as medium.

Fish

7.3.113 The EA provided records of fish species within 3km of the Order Limits, from 24 historic monitoring sites covering 14 of the proposed crossings. Data for the five watercourses where EA provided data and where crossing would be via open cut construction (WCX006, WCX007, WCX012, WCX021 and WCX047 – see Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report) are summarised in Table 7.13. Brown trout (*Salmo trutta*) and bullhead (*Cottus gobio*) are of conservation interest, require good quality watercourses and favour solid substrates and dynamic flow types. European eel (*Anguilla anguilla*) and brown trout are also migratory species, and eel is Critically Endangered.

Table 7.13: Environment Agency Fish Records Within 3km of Crossing Locations of the Route at Relevant Watercourse Crossings

Watercourse Crossing Reference	Survey Location	Distance From Crossing (km)	Year	Species
WCX006	Tangier Farm SU53900 17300	1.2	2008, 2013	Brown trout, bullhead, European eel, three-spined stickleback (<i>Gasterosteus aculeatus</i>)

Watercourse Crossing Reference	Survey Location	Distance From Crossing (km)	Year	Species
Tributary of River Hamble	Brooklands farm SU54200 16500	1.8	2008, 2013	Brook lamprey (<i>Lampetra planeri</i>), brown trout, bullhead, European eel, three-spined stickleback
WCX007 Tributary of River Hamble	Tangier Farm SU53900 17300	1.7	2008, 2013	Brown trout, bullhead, European eel, three-spined stickleback
WCX012 Caker Stream	Caker Lane- The Clock House SU72692 37987	0.2	2014, 2015	Brown trout, bullhead, minnow (<i>Phoxinus phoxinus</i>), three-spined stickleback, stone loach (<i>Barbatula barbatula</i>)
	Gaston Lane SU72666 35966	2	2012	None recorded
WCX021 Ryebridge Stream	Upstream Froyle Mill SU76400 42400	1	2002	Brown trout, bullhead, dace (<i>Leuciscus leuciscus</i>), minnow, stone loach
WCX047 Tributary of Cove Brook	Downstream of former Southwood Golf Course SU85518 54963	0.3	2006, 2013	Bullhead, chub (<i>Squalius cephalus</i>), perch (<i>Perca fluviatilis</i>), pike (<i>Esox lucius</i>), roach (<i>Rutilus rutilus</i>).

7.3.114 Of the 85 watercourses crossed by the Order Limits (see Figure A7.5.1 in Appendix 7.5 Aquatic Ecology factual Report), nearly half were minor relic field drains with limited fish interest. The following watercourse crossings were identified as having high sensitivity for fish species during habitat walkover surveys:

- WCX002a – Ford Lake Stream (Section A);
- WCX012 – Caker Stream (Section A);
- WCX019 – River Wey (Section C);
- WCX047 – Ively Brook (Section E);
- WCX048 – Cove Brook (Section E);
- WCX051 – River Blackwater (Section E);
- WCX066 – River Halebourne (Section F);
- WCX095 – Chertsey Bourne (Section G); and
- WCX096 – River Thames (Section G).

7.3.115 Moderate sensitivity for fish was identified at three watercourses crossed by the Order Limits: WCX021; WCX067; and WCX068a. This category allocation is based on desk study records for fish identified downstream of the proposed crossing points, beyond a confluence with another watercourse.

7.3.116 Four watercourse crossing sites which lacked both EA fisheries data and a conclusive assessment of the habitat from walkover surveys, were sampled for fish eDNA. The results are provided in Table 7.14. WCX007 was dry at the time of survey and no sample could be taken. WCX006 returned weak positive results for the presence of bullhead and moderate positive results for the presence of European

eel. These species were absent in the WCX048. W101 showed a weak positive result for the presence of bullhead and a moderate positive result for the presence of European eel. W101 is situated downstream of WCX100 and it is considered valid that fish would move freely between these sites.

Table 7.14: Fish Species and Relative Proportion of the DNA Sequencing Results

Common Name	Scientific Name	WCX006	WCX007	WCX048	W101 (survey location for WCX100)
Common bream	<i>Abramis brama</i>	-	DRY	0.6	-
European eel	<i>Anguilla anguilla</i>	8.65		-	10.02
Stone loach	<i>Barbatula barbatula</i>	-		20.29	2.28
Crucian carp	<i>Carassius carassius</i>	-		2.23	1.78
Bullhead	<i>Cottus gobio</i>	18.94		-	5.13
Pike	<i>Esox lucius</i>	-		1.37	15.45
Three-spined stickleback	<i>Gasterosteus aculeatus</i>	70.28		48.59	-
Gudgeon	<i>Gobio gobio</i>	-		-	7.3
Dace	<i>Leuciscus leuciscus</i>	-		-	4.34
Perch	<i>Perca fluviatilis</i>	-		-	15.55
Minnnow	<i>Phoxinus phoxinus</i>	-		0.57	8.1
Nine-spined stickleback	<i>Pugitius pungitius</i>	-		1.15	-
Roach	<i>Rutilus rutilus</i>	0.91		11.2	23.29
Atlantic salmon	<i>Salmo salar</i>	0.27		-	-
Chub	<i>Squalius cephalus</i>	-		8.8	6.75
Non-fish species	-	0.94		5.2	-

Value

- 7.3.117 The large number of watercourses within the study area support a range of habitats that could be used by different fish species. The fish communities that include migratory life stages are particularly sensitive to in-channel works and so are considered to be of medium value. This includes sites known to support European eel, Atlantic salmon, lamprey species and sea trout.
- 7.3.118 Fish communities comprising non-migratory species are typically ubiquitous to watercourses surveyed across the Order Limits. These communities have a lower sensitivity to change and are therefore assessed as being of low value.

Great Crested Newt

Desk Study

- 7.3.119 A total of 205 ponds were identified within 250m of the Order Limits by the desk study (OS mapping, aerial photography and Phase 1 mapping – Figure 7.4).
- 7.3.120 Seventeen records of GCN within 1km of the Order Limits (see Figure A7.10.1, Appendix 7.10 GCN Factual Report) were found, including in ponds within 250m of the Order Limits.

Field Surveys

- 7.3.121 Habitat Suitability Index (HSI) surveys were completed on 153 ponds within 250m of the Order Limits. Of these, 121 ponds were sampled for eDNA, which returned 15 positive results for GCN, 105 negative results and one inconclusive result (see Appendix 7.10 GCN Factual Report for full details).
- 7.3.122 GCN were confirmed as present at 22 ponds within 250m of the Order Limits based on a combination of desk study and field survey. GCN were assumed to be present at one further pond which could not be surveyed but was located within 100m of a pond with confirmed GCN presence.
- 7.3.123 GCN presence within 250m of the Order Limits has been confirmed at the following locations:
- Section A – east of the Order Limits, north of Bishop’s Waltham.
 - Section C – southeast of Alton (west of the A31) and north of Upper Froyle.
 - Section D – Oak Park Golf Course.
 - Section F – Windlemere Golf Course and Foxhills Golf Course.
 - Section H – west of Queen Mary Reservoir.
- 7.3.124 A total of ten ponds were subject to population estimate surveys as they were located within 50m of the Order Limits. These surveys identified two ponds with a medium sized population of GCN (Ponds 127 and 127a) and eight ponds with small populations (Ponds 39, 55, 57a, 128, 129a, 194a, 194c, and 201) (see Figure A7.10.2 in Appendix 7.10 GCN Factual Report).
- 7.3.125 Three metapopulations of GCN were identified at Upper Froyle (Ponds 55, 56, 57, 57a), Windlemere Golf Course (Ponds 127, 127a, 128, 129a) and Foxhills Golf Course (Ponds 194a, 194c, 201).

Value

- 7.3.126 The GCN populations identified within the 250m buffer of the Order Limits likely represent a small proportion of the overall GCN populations in the counties of Surrey and Hampshire, where GCN has recently been recorded in most 10km squares (Amphibian and Reptile Conservation Trust, 2018). As such, GCN are afforded a medium value.

Rare Reptiles

Desk Study

- 7.3.127 The distribution of rare reptiles (i.e. sand lizard (*Lacerta agilis*)) within the study area is restricted to a small number of well-studied heathland sites in Surrey. Data from SARG indicate that sand lizard is present at Chobham Common SSSI/NNR and Colony Bog and Bagshot Heath SSSI (specifically in Unit 5 of the SSSI, known as Turf Hill) (see Figure A7.11.1 of Appendix 7.11 Reptile Factual Report). No surveys were undertaken at these SSSI as presence of these species had already been confirmed.



- 7.3.128 The Order Limits encompass suitable sand lizard habitat at Chobham Common SSSI/NNR. The route also passes through the Turf Hill unit of Colony Bog and Bagshot Heath SSSI although the habitats within the Order Limits are unsuitable for this species as they are dominated by plantation Scots pine.

Value

- 7.3.129 The sand lizard is found in three distinct areas of the UK: Dorset, the Weald and Merseyside. Chobham Common is within the Weald, where the total population was estimated at <1,000 in 1994 (Corbett, 1994). Since this estimate it is believed that the population has remained relatively stable (JNCC, 2006). The most recent full UK estimate stands at approximately 300 metapopulations, comprising approximately 580 populations (or subpopulations) (JNCC, 2006). The conservation status of the species in the UK as a whole is considered unfavourable, inadequate but improving (JNCC, 2006).
- 7.3.130 Sand lizards were believed to be extinct at Chobham Common by the 1980s and the current population is a result of a reintroduction by the Herpetological Conservation Trust (the predecessor organisation to Amphibian and Reptile Conservation Trust).
- 7.3.131 Due to the rarity of sand lizard and their restricted distribution across the UK, this species is given a valuation of high.

Common Reptiles

Desk Study

- 7.3.132 Desk study records from HBIC and SARG confirm common reptiles (adder, grass snake (*Natrix helvetica*), slow worm (*Anguis fragilis*) and common lizard (*Zootoca vivipara*)) are widely distributed along the route. Most of these records are located in Section F due to presence of high-quality reptile habitat (heathland) and the comprehensive monitoring undertaken by SARG within this section (see Figure A7.11.2, Appendix 7.11 Reptile Factual Report for details).
- 7.3.133 At various locations along the route, the Order Limits encompass suitable reptile habitat such as rough grassland, woodland rides and heathland (Figure 7.4). These data and the results of the desk study formed the basis for the selection of sites for further assessment.

Field Survey

- 7.3.134 Surveys were undertaken at six sites. Results were suggestive of low populations of slow worm, common lizard and grass snake (see Appendix 7.11 Reptile Factual Report for detail).

Value

- 7.3.135 Common reptile species recorded are widespread and abundant, particularly in the southeast of England (Wilkinson and Arnell, 2013). The low populations of common reptiles identified are highly unlikely to significantly contribute to county or regional populations and as such are valued as low.



Otter

Desk Study

- 7.3.136 The desk study identified otter presence on the:
- Tributary of the River Hamble (WCX006 – Section A);
 - River Wey (WCX019 – Section C);
 - Cove Brook (WCX048 – Section E); and
 - Blackwater Valley (WCX051 – Section E).

Field Survey

- 7.3.137 No couches or holts were identified during field survey. However, otter spraints and feeding remains were found on Cove Brook (Figure A7.12.1 of Appendix 7.12 Riparian Mammal Factual Report). No other signs of otter were recorded at any watercourse or water body to be crossed by the Order Limits. All main river watercourses crossed by the Order Limits had the potential to support commuting and foraging otter. The minor watercourses had only limited potential to support otter although the occasional presence of this species cannot be dismissed due to the wide-ranging and transient habitats of this species.

Value

- 7.3.138 The otter is currently recovering from a severe population crash in the 1960s-1970s which extirpated populations from much of England. The fifth national otter survey of England (2009-2010) has shown that the recovery of the otter has continued, with otter being present across all regions. (Environment Agency, undated). The distribution of otter across Great Britain reported in *Britain's Mammals 2018* was found to be much larger than that previously reported in 1995 with a 49% increase in the population size (Mathews *et al.*, 2018). Otter is widespread across the UK and although still at relatively low abundance in parts of the UK i.e. the southeast of England, the otter has a favourable reference population value (JNCC, 2013).
- 7.3.139 The areas of watercourses within the Order Limits are small and are unlikely to make a significant contribution to breeding, commuting or foraging otter. However, otter have the potential to use any watercourses occasionally and as such otter within the study area around the Order Limits are precautionarily valued as medium.

Water Vole

Desk Study

- 7.3.140 The desk study identified one record of water vole, from 2009, on a tributary of the River Hamble (WCX006) to the west of Bishop's Waltham (Section A). When surveyed, this watercourse was found to be sub-optimal for water vole and it is possible that the suitability and habitats present have changed since that time. At the time of survey, the banks were heavily covered in Himalayan balsam and were of sub-optimal profile for burrowing individuals.



- 7.3.141 The most recent water vole record from Surrey was submitted to the National Water Vole Database in 2008 (McGuire & Whitfield, 2017). There is concern that the species may be functionally extinct in the county (Surrey Wildlife Trust, 2018).
- 7.3.142 No records of water vole were returned by GiGL. Bedfont Lakes Country Park Site of Metropolitan Importance (SMI) is approximately 420m to the east of the Order Limits. This SMI is a restored gravel extraction and land-fill site, now managed as a country park, which underwent reintroduction of water vole in 2002. However, the site is not connected to any water body/watercourse intersected by the Order Limits.

Field Survey

- 7.3.143 No evidence of water vole was found during field survey with the habitats recorded being largely unsuitable or sub-optimal for this species. As such, water vole are considered to be absent within the Order Limits and the riparian habitats within 200m to either side of all watercourse crossings.

Value

- 7.3.144 Although water vole was thought to be present on all of the main river catchments in Hampshire in the 1990s (Jordan, 1998), population decline since has resulted in water vole being rare in Hampshire with recent strategic reintroductions undertaken on the River Meon and Alver Valley, over 15km to the east of the route (McGuire and Whitfield, 2017). Water vole is assumed absent from Surrey.
- 7.3.145 As such, water vole potentially present within the study area around the Order Limits are valued as high.

Future Baseline in the Absence of the Project

- 7.3.146 If development consent is granted, construction works would be undertaken between 2020 and 2023 (see Chapter 3 Project Description). Between the date of this assessment and the proposed construction period, the ecological baseline within the Order Limits could change. Anticipated changes to the baseline over this period are described below.

Change in Land Use Practices

- 7.3.147 In urban areas within the study area, the ecological baseline is unlikely to significantly change as the land use at these locations would likely remain the same between the date of this assessment and the proposed construction period.
- 7.3.148 In agricultural areas, which comprise the majority of areas of the Order Limits, ecological conditions are unlikely to change significantly in the short term as current agricultural practices are likely to be maintained i.e. arable land would likely be used for growing crops or used as ley-grassland; improved or semi-improved grasslands would likely continue to be used for grazing livestock. In general, hedgerows, woodlands and trees are likely to be retained by landowners, although these may be subject to routine management activities. As such, unpredictable changes in the biodiversity value or spatial extent of semi-natural habitat are unlikely to occur.



- 7.3.149 The study area comprises large areas of heathland that is protected by statutory designations. The legal protection afforded to these sites requires that they be managed by the landowners in accordance with the respective conservation objectives. Legal protection and planning policy also reduces the likelihood that these sites would undergo significant modification due to changes in land use and management or other activities on them. Although there might be some local changes due to positive habitat management measures e.g. woodland or scrub removal, the baseline conditions on heathland sites are unlikely to significantly alter.
- 7.3.150 When first subject to baseline assessments in 2018, the former Southwood Golf Course was still in use as a golf course and was dominated by short mown amenity grassland. However, in October 2018, the golf course was closed to the public. The baseline conditions of this site will likely change in the short term as Rushmoor Borough Council converts the site to a SANG and undertakes landscape and habitat improvements e.g. wetland creation and woodland planting (*pers. comm.* Rushmoor BC Biodiversity Officer). Subject to the granting of development consent, construction at the former Southwood Golf Course would take place between 2020 and 2023. Assuming that Rushmoor Borough Council starts landscape and habitat works in prior to construction of the project, the newly created habitats would likely still be immature and of low biodiversity value. As such, the anticipated changes to the baseline conditions are not likely to significantly affect the ecological assessment within this ES.

Climate Change

- 7.3.151 In Britain, it is anticipated that climate change will bring a possible 2 to 4°C increase in mean summer temperatures in the longer term, with milder winters, changes in rainfall distribution and seasonality, more extremes of weather and sea level rise (UK Environmental Change Network, 2009).
- 7.3.152 The MONARCH project (Walmsley *et al.*, 2007) and Biodiversity Climate Change Impacts Report Card (Natural Environment Research Council, 2016) have identified potential future changes in the natural environment caused by climate change and consequential responses by sensitive habitats and species. However, whilst climate models project changes in temperature with reasonable confidence, the complexities of ecological responses mean that there is a large range of possible future outcomes. However, it can be reasonably assumed that the presence of the project would have no significant impact or cause acceleration of ecosystem responses to climate change. The design of the project has incorporated climate change responses e.g. increase in flooding (see Chapter 8 Water).

7.4 Design and Good Practice Measures

- 7.4.1 A summary of design measures and good practice is provided in this section, with the measures then presented in full as part of the assessment in Section 7.5 Potential Impacts (Without Mitigation). Including the measures as part of the biodiversity impact assessment is intended to make it easier to link these measures to ecological receptors, due to the number of potential impact pathways, and the number of design and good practice measures that are applicable.

Embedded Design Measures

- 7.4.2 All commitments are listed within the Register of Environmental Actions and Commitments (REAC), which is included within Chapter 16 Environmental Management and Mitigation. Commitments include embedded design measures, good practice measures and mitigation required to reduce potentially significant effects.
- 7.4.3 Chapter 4 Design Evolution provides a summary of the environmental considerations that have influenced the design through this process, with iterative updates and improvements to reach the fixed design submitted for development consent. The embedded design measures have been built into the project, for example through the amendments during preparation of the Order Limits to avoid a sensitive feature. Examples relevant to this chapter include changing the positions of the Order Limits and Limits of Deviation to avoid Ancient Woodland identified in the Ancient Woodland inventory for England (NE, 2018).
- 7.4.4 Where practicable, the positions of the Order Limits and Limits of Deviation have also been designed to avoid and reduce impacts on the following ecological receptors:
- all statutory and non-statutory designated sites;
 - Priority Habitats, especially those where uncertainty exists relating to the effectiveness of reinstatement e.g. wetland habitats;
 - Potential Ancient Woodland Sites (less than 2ha) not included in the Ancient Woodland inventory; and
 - sites supporting protected species.
- 7.4.5 Overarching commitments embedded into the project design are listed in Chapter 4 Design Evolution. Those of benefit to ecological receptors are:
- commitment to only utilise a 10m width when crossing through boundaries between fields where these include hedgerows, trees or watercourses (O1);
 - the standard working width, for open trench construction in rural areas, is a nominal 30m (O3);
 - design route alignment to avoid all areas of existing classified Ancient Woodland (O2); and
 - trenchless crossing technology to be used for crossings of waterways over 30m wide (O5).
- 7.4.6 Appendix 4.1 Pipeline Route Corridor Options outline the embedded measures with respect to ecological receptors. These measures avoid or reduce a number of potential impacts on ecological receptors.

Good Practice Measures

- 7.4.7 This chapter contains a number of project commitments to reduce impacts on the environment. These are indicated by a reference number like this (G20). All commitments are listed within the REAC, which is included within Chapter 16



Environmental Management and Mitigation. Good practice measures are set out in the REAC and secured through Development Consent Order (DCO) requirements such as the CoCP. These are applicable to all areas unless stated otherwise. The following assessment is based on these good practice measures being in place.

7.5 Potential Impacts (Without Mitigation)

- 7.5.1 The scope of the assessment has been informed by the Scoping Opinion, provided by the Planning Inspectorate in September 2018, on behalf of the Secretary of State, following the submission of the Scoping Report (Esso, 2018). The scope of the assessment is set out in Table 7.15.
- 7.5.2 This assessment is receptor-based, with the potential effect for each ecological receptor discussed. The assessment of potential impacts assumes all embedded design and good practice measures are in place. For transparency, the assessment refers to impacts that may occur prior to the implementation of embedded and good practice measures to illustrate the change that would occur if these measures were not implemented. This demonstrates how each potential impact would be avoided or reduced through the application of the relevant embedded design and good practice measures.
- 7.5.3 Potential residual effects are assessed on the assumption that the embedded and good practice measures are in place.
- 7.5.4 Most of the potential effects identified would be restricted to the Order Limits and would be temporary, short term and reversible. The majority of potential impacts would occur during the construction period, although operational impacts are also considered.



Table 7.15: Matters Considered in this Assessment

Ecological Receptor Within Zones of Influence for the Respective Potential Impact		Potential Impact
Construction phase		
Statutory designated sites	<ul style="list-style-type: none"> • Thames Basin Heaths SPA; • Bourley and Long Valley SSSI; • Thursley, Ash, Pirbright and Chobham SAC; • Basingstoke Canal SSSI; • Colony Bog and Bagshot Heath SSSI; • Chobham Common SSSI/NNR; • Chertsey Meads LNR; and • Dumsey Meadow SSSI. 	Habitat loss/gain, fragmentation or modification due to vegetation/site clearance
	<ul style="list-style-type: none"> • Thames Basin Heaths SPA; • Bourley and Long Valley SSSI; • Thursley, Ash, Pirbright and Chobham SAC; • Basingstoke Canal SSSI; • Eelmoor Marsh SSSI; • Colony Bog and Bagshot Heath SSSI; • Chobham Common SSSI/NNR; • Chertsey Meads LNR; and • Dumsey Meadow SSSI. 	Habitat loss/modification as a result of introduction and/or spread of INNS
	<ul style="list-style-type: none"> • Thames Basin Heaths SPA (qualifying species of Dartford warbler, nightjar and woodlark); • Bourley and Long Valley SSSI (faunal interest features of adder, breeding birds and invertebrates); • Colony Bog and Bagshot Heath SSSI (breeding birds and invertebrates); and • Chobham Common SSSI/NNR (breeding birds and invertebrates). 	Species injury/mortality
	<ul style="list-style-type: none"> • Solent and Southampton Water SPA/Ramsar (qualifying features of wintering and breeding bird assemblages); • Solent and Dorset Coast pSPA (qualifying species of Sandwich tern, common tern and little tern); • Thames Basin Heaths SPA (qualifying species of Dartford warbler, nightjar and woodlark); • Bourley and Long Valley SSSI (faunal interest features of adder, breeding birds and invertebrates); 	Species disturbance (from changes to noise, vibration, visual and light stimuli)



Ecological Receptor Within Zones of Influence for the Respective Potential Impact	Potential Impact
<ul style="list-style-type: none"> • Colony Bog and Bagshot Heath SSSI (breeding birds and invertebrates); • Chobham Common SSSI/NNR (breeding birds and invertebrates); and • South West London Waterbodies SPA/Ramsar (qualifying species of gadwall and shoveler); and component Staines Moor SSSI. 	
<ul style="list-style-type: none"> • Bourley and Long Valley SSSI (a component of Thames Basin Heaths SPA); • Eelmoor Marsh SSSI (a component of Thames Basin Heaths SPA); • Colony Bog and Bagshot Heath SSSI (a component of Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC); • Chobham Common SSSI and NNR (a component of Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC); • Chertsey Meads LNR; and • Dumsey Meadow SSSI 	<p>Habitat loss/gain, fragmentation or modification of groundwater dependent terrestrial ecosystems due to:</p> <ul style="list-style-type: none"> • changes to groundwater levels or flow direction caused by temporary dewatering; and/or • changes to groundwater quality from chemical or pollutant leaks and spills
<ul style="list-style-type: none"> • Solent and Southampton Water SPA/Ramsar; • Solent and Dorset Coast pSPA; • Solent Maritime SAC; • Upper Hamble Estuary and Woods SSSI; • Thames Basin Heaths SPA; • Bourley and Long Valley SSSI; • Basingstoke Canal SSSI; • Eelmoor Marsh SSSI; • Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC; • Colony Bog and Bagshot Heath SSSI; • Chobham Common SSSI/NNR; • South West London Waterbodies SPA/Ramsar; and • Staines Moor SSSI. 	<p>Hydrological change – surface water contamination</p>
<ul style="list-style-type: none"> • Thames Basin Heaths SPA; • Bourley and Long Valley SSSI; • Basingstoke Canal SSSI; • Eelmoor Marsh SSSI; 	<p>Air quality changes – dust deposition</p>



Ecological Receptor Within Zones of Influence for the Respective Potential Impact		Potential Impact
	<ul style="list-style-type: none"> • Thursley, Ash, Pirbright and Chobham SAC • Colony Bog and Bagshot Heath SSSI; • Chobham Common SSSI and NNR; • Chertsey Meads LNR; and • Dumsey Meadow SSSI. 	
Non-statutory designated sites	<p><u>Hampshire</u></p> <ul style="list-style-type: none"> • SINCs: Maddoxford Farm Meadows; Brockwood Copse and Roadside Strips; Water Lane; Ewshot Meadows; Meadow Near Soanes Copse; Wakefords Copse, Crondall; Pyestock Hill/Pondtail Heath; Pyestock (North Grasslands); South of Ively Road; Cove Brook Grassland; Cove Valley, Southern Grassland; and Blackwater Valley, Frimley Bridge. • RVEI: None <p><u>Surrey</u></p> <ul style="list-style-type: none"> • SNCIs: Frimley Hatches (including Frimley Reedbeds); Frith Hill; Frimley Fuel Allotments; Monk's Walk North and West (incl. M3 Exchange Land); Pannells Farm; Chertsey Bourne at Chertsey Meads; Chertsey Meads; River Thames to Runnymede; River Thames - County boundary to Sunbury (boundary with London Borough of Richmond); Land west of Littleton Lane; Shepperton Quarry; Land west of Queen Mary Reservoir, Ashford Road; and Princes Lake. • Conservation Verges: None. <p><u>Greater London</u></p> <ul style="list-style-type: none"> • SMI: None • SBI: None 	Habitat loss/gain, fragmentation or modification – direct impact
	<p><u>Hampshire</u></p> <ul style="list-style-type: none"> • SINCs: Maddoxford Farm Meadows; Stephen's Castle Down (East); Joan's Acre Wood; Lomer Rows; Brockwood Copse and Roadside Strips; Merryfield Grove; Little Down; Hughes Copse; Noar Copse; Water Lane; Neatham Farm Manor Copse; Ewshot Woods; Skains Copse/Combe Wood/Turners Copse; Ewshot Meadows; Meadow Near Soanes Copse; Wakefords Copse, Crondall; Greendane Copse; Pyestock Hill/Pondtail Heath; Pyestock (North Grasslands); Ball Hill; South of Ively Road; Cove Brook Grassland; Cove Valley, Southern Grassland; and Blackwater Valley, Frimley Bridge. • RVEI: C9 Belmore, Upham. <p><u>Surrey</u></p>	Habitat loss/modification as a result of introduction and/or spread of INNS



Ecological Receptor Within Zones of Influence for the Respective Potential Impact	Potential Impact
<ul style="list-style-type: none"> • SNCIs: Frimley Hatches (including Frimley Reedbeds); Frith Hill; Frimley Fuel Allotments; The Folly; Halebourne Copse and Fields; Chobham Place Grassland; Monk's Walk North and West (incl. M3 Exchange Land); Pannells Farm; Chertsey Bourne at Chertsey Meads; Chertsey Meads; River Thames to Runnymede; River Thames - County boundary to Sunbury (boundary with London Borough of Richmond); Land west of Littleton Lane; Shepperton Quarry; Land west of Queen Mary Reservoir, Ashford Road; and Princes Lake. • Conservation Verges: None. <p><u>Greater London</u></p> <ul style="list-style-type: none"> • SBI: None • SMI: None 	
<p><u>Hampshire</u></p> <ul style="list-style-type: none"> • Dormouse in Skains Copse/Combe Wood/Turners Copse SINC, Woodlands A, B & D Meadows SINC, and Beacon Hill/Parkhurst Hill SINC <p><u>Surrey</u></p> <ul style="list-style-type: none"> • Breeding birds at Chobham Place Woods SNCI, Little Heath SNCI, Simplemarsh Farm SNCI and Sheep Walk Lane SNCI. • Wintering birds at Frimley Hatches (including Frimley Reedbeds) SNCI, Land West of Littleton Lane SNCI, Shepperton Quarry SNCI, Sheep Walk Lane SNCI, West of Queen Mary Reservoir SNCI and Queen Mary Reservoir SNCI. • Fish at Field between Hook and Priest Lane SNCI (brown trout) and at River Thames - County boundary to Sunbury (boundary with London Borough of Richmond) SNCI (eel, salmon, sea trout). • Otter at River Thames - County boundary to Sunbury (boundary with London Borough of Richmond) SNCI. <p><u>Greater London</u></p> <ul style="list-style-type: none"> • Birds at Bedfont Lakes SMI 	<p>Species disturbance (from changes to noise, vibration, visual and light stimuli)</p>
<p><u>Hampshire</u></p> <ul style="list-style-type: none"> • Botley Golf Course Wood SINC and Maddoxford Farm Meadows SINC (Ford Valley); • Peck Copse SINC; • Ewshot Meadows SINC; • Cove Brook Grassland SINC and Cove Valley Southern Grassland SINC (Cove Valley); and • Blackwater Valley, Frimley Bridge SINC. <p><u>Surrey</u></p>	<p>Habitat loss/gain, fragmentation or modification of groundwater dependent terrestrial ecosystems due to:</p> <ul style="list-style-type: none"> • changes to groundwater levels or flow direction caused by temporary dewatering; and/or • changes to groundwater quality from chemical or pollutant leaks and spills



Ecological Receptor Within Zones of Influence for the Respective Potential Impact	Potential Impact
<ul style="list-style-type: none"> • Frimley Hatches (including Frimley Reedbeds) SNCI; and • Pannells Farm SNCI (Addlestone Moor). <p><u>Greater London</u></p> <ul style="list-style-type: none"> • None 	
<p><u>Hampshire</u></p> <ul style="list-style-type: none"> • SINC: Maddoxford Farm Meadows; Peck Copse; Water Lane; Quarry Bottom; Ewshot Wood; Skains Copse/Combe Wood/Turners Copse; Ewshot Meadows; Soanes Copse/Wood Copse; Beacon Hill/Parkhurst Hill; Pyestock Hill/Pondtail Heath; Cove Brook Grassland; Cove Valley, Southern Grassland; and Blackwater Valley, Frimley Bridge. • RVEI: None <p><u>Surrey</u></p> <ul style="list-style-type: none"> • SNCI: Frimley Hatches (including Frimley Reedbeds); Frith Hill; The Folly; Pannells Farm; Chertsey Bourne at Chertsey Meads; River Thames to Runnymede; River Thames - County boundary to Sunbury (boundary with London Borough of Richmond); Land west of Littleton Lane; and Land west of Queen Mary Reservoir, Ashford Road. <p><u>Greater London</u></p> <ul style="list-style-type: none"> • SMI: None • SBI: None 	Hydrological change – surface water contamination
<p><u>Hampshire</u></p> <ul style="list-style-type: none"> • SINC: Maddoxford Farm Meadows; Durley Mill Copse; Stephen's Castle Down (East); Preshaw Wood; Blackhouse Row; Joan's Acre Wood; Lomer Rows; Riversdown Wood; Brockwood Copse and Roadside Strips; Brockwood Park, Area A; Bramdean Common – The Plantation; Bramdean Common; Merryfield Grove; Battles Copse; Little Down; Hughes Copse; Woodside Row; Chawton Park Wood; Chawton Paceway; Noar Copse; Peck Copse; Water Lane; Neatham Farm Manor Copse; Lawn Copse; Ewshot Woods; Skains Copse/Combe Wood/Turners Copse; Ridings Copse and Shaw; Ewshot Meadows; Meadow Near Soanes Copse; Wakefords Copse, Crondall; Greendane Copse; Pyestock Hill/Pondtail Heath; Pyestock (North Grasslands); Ball Hill; South of Ively Road; Cove Brook Grassland; Cove Valley, Southern Grassland; Ship Lane Cemetery; and Blackwater Valley, Frimley Bridge. • RVEI: C9 Belmore, Upham. <p><u>Surrey</u></p>	Air quality changes – dust deposition



Ecological Receptor Within Zones of Influence for the Respective Potential Impact		Potential Impact
	<ul style="list-style-type: none"> SNCIs: Frimley Hatches (including Frimley Reedbeds); Frith Hill; Frimley Fuel Allotments; White Hill; The Folly; Burnt Pollard Lane Meadows; Hardwick Court Farm Fields; Simplemarsh Farm; Halebourne Copse and Fields; Chobham Place Grassland; Chobham Place Woodland; Monk's Walk North and West (incl. M3 Exchange Land); Pannells Farm; Chertsey Bourne at Chertsey Meads; Chertsey Meads; River Thames to Runnymede; River Thames - County boundary to Sunbury (boundary with London Borough of Richmond); Land west of Littleton Lane; Shepperton Quarry; Littleton Lake; Land west of Queen Mary Reservoir, Ashford Road; and Princes Lake. Conservation Verges: None. <p><u>Greater London</u></p> <ul style="list-style-type: none"> SBI: None SMI: None 	
Ancient Woodland	<p>Ancient Woodland Inventory Site: None</p> <p>Potential Ancient Woodland Sites (less than 2ha): seven sites (AW2; AW4a; AW15a; AE30; and AW41)</p>	Habitat loss/gain, fragmentation or modification
	<p>Ancient Woodland Inventory Site: 9</p> <p>Potential Ancient Woodland Sites (less than 2ha): 14 sites (AWAW2; AW3; AW4a; AW5; AW5a; AW12; AW13; AW13a; AW15a; AW29; AW30; AW31; and AW41)</p>	Habitat loss/modification as a result of introduction and/or spread of INNS
	<p>Ancient Woodland Inventory Sites: 15</p> <p>Potential Ancient Woodland Sites (less than 2ha): 28 plots (all identified)</p>	Air quality changes – dust deposition
Priority Habitats	<ul style="list-style-type: none"> Coastal and Floodplain Grazing Marsh; Hedgerows; Lowland Dry Acid Grassland; Lowland Fens; Lowland Mixed Deciduous Woodland; Lowland Heathland; Lowland Meadows; Lowland Mixed Deciduous Woodland; Purple Moor-grass and Rush Pastures; Reedbeds; and Wet Woodland. 	Habitat loss/gain, fragmentation or modification
		Habitat loss/modification as a result of introduction and/or spread of INNS
		Air quality changes – dust deposition



Ecological Receptor Within Zones of Influence for the Respective Potential Impact		Potential Impact
	<ul style="list-style-type: none"> Coastal and Floodplain Grazing Marsh; Purple Moor-grass and Rush Pastures; and Wet Woodland. 	Habitat loss/gain, fragmentation or modification of groundwater dependent terrestrial ecosystems due to: <ul style="list-style-type: none"> changes to groundwater levels or flow direction caused by temporary dewatering; and/or changes to groundwater quality from chemical or pollutant leaks and spills
Notable plants	<ul style="list-style-type: none"> Heathland plant assemblages (outside statutory and non-statutory designated sites) 	Habitat loss/gain, fragmentation or modification
Species	<ul style="list-style-type: none"> Aquatic macroinvertebrates; Bats; Breeding birds; Dormouse; Fish; GCN; Common reptiles; Rare reptiles (sand lizard); and Riparian mammals (otter and water vole). 	Mortality and injury Habitat loss/gain, fragmentation or modification
	Aquatic macroinvertebrates	Hydrological change during open cut crossings of watercourses and through surface water contamination
	<ul style="list-style-type: none"> Bats; Breeding birds; Dormouse; Fish; GCN; Common reptiles; Rare reptiles (sand lizard); and Riparian mammals (otter and water vole). 	Disturbance – lighting, noise and vibration



Ecological Receptor Within Zones of Influence for the Respective Potential Impact		Potential Impact
Operational phase		
Statutory designated sites	<ul style="list-style-type: none"> • Bourley and Long Valley SSSI (a component of Thames Basin Heaths SPA); • Eelmoor Marsh SSSI (a component of Thames Basin Heaths SPA); • Colony Bog and Bagshot Heath SSSI (a component of Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC); • Chobham Common SSSI and NNR (a component of Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC); • Chertsey Meads LNR; and • Dumsey Meadow SSSI. 	<p>Habitat loss/gain, fragmentation or modification of groundwater dependent terrestrial ecosystems due to</p> <ul style="list-style-type: none"> • Groundwater flow interception; and/or • changes to groundwater quality from pipeline leaks.
Non-statutory designated sites	<ul style="list-style-type: none"> • Botley Golf Course Wood SINC and Maddoxford Farm Meadows SINC (Ford Valley); • Peck Copse SINC; • Ewshot Meadows SINC; • Cove Brook Grassland SINC and Cove Valley Southern Grassland SINC (Cove Valley); • Blackwater Valley, Frimley Bridge SINC and Frimley Hatches (including Frimley Reedbeds) SNCI; and • Pannells Farm SNCI (Addlestone Moor). 	<p>Habitat loss/gain, fragmentation or modification of groundwater dependent terrestrial ecosystems due to</p> <ul style="list-style-type: none"> • Groundwater flow interception; and/or • changes to groundwater quality from pipeline leaks.
Priority Habitats	<ul style="list-style-type: none"> • Wet Woodland; and • Coastal and Floodplain Grazing Marsh (Wintershill and River Wey Floodplain). 	Hydrological change - in groundwater level or flow direction impacting groundwater dependent terrestrial ecosystems
Species	<ul style="list-style-type: none"> • Bats including foraging/commuting habitat; • Riparian mammals; • Breeding birds; and • Fish. 	Disturbance – lighting and noise/vibration at permanent above ground infrastructure (modernised Pumping Station at Alton and new Pigging Station at Boorley Green)

Construction

- 7.5.5 This section describes the receptors and impact pathways that may lead to potential significant effects during the construction phase of the project, as summarised in Table 7.15.

Statutory Designated Sites

- 7.5.6 The alignment of the Order Limits and the proposed construction methods in relation to statutory sites have been influenced by the results of baseline ecological surveys and consultation (see Chapter 5 Consultation and Scoping). This design development has reduced or avoided impacts to the most sensitive habitats and receptors within statutory designated sites (see Chapter 4 Design Evolution).
- 7.5.7 Potential likely significant effects to European sites are assessed in detail in the project's Habitats Regulations Assessment (HRA) Report (**application document 6.5**). The European sites where potential source-receptor effect pathways with the project were identified comprise:
- Solent Maritime SAC;
 - Solent and Southampton Water SPA;
 - Solent and Southampton Water Ramsar site;
 - Solent and Dorset Coast pSPA;
 - South West London Waterbodies SPA;
 - South West London Waterbodies Ramsar site;
 - Thames Basin Heaths SPA; and
 - Thursley, Ash, Pirbright and Chobham SAC.
- 7.5.8 Due primarily to the small-scale nature of the works and the distance between these sites and the project, the HRA (Stage 1 Screening) concluded that there would be no likely significant effects, either alone or in combination, to the Solent Maritime SAC, Solent and Southampton Water SPA/Ramsar, Solent and Dorset Coast pSPA or the South West London Waterbodies SPA/Ramsar.
- 7.5.9 Potential significant effects on Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC could not be discounted at Stage 1 Screening without further assessment or the application of mitigation. As such, these sites were considered by a Stage 2 Appropriate Assessment, as summarised here.

Thames Basin Heaths SPA

- 7.5.10 Potential source-receptor pathways for effects to the Thames Basin Heaths SPA identified by the Stage 1 study comprised disturbance impacts to the qualifying bird species during construction. The potential for disturbance effects arising from two sources were advanced to Stage 2: changes in the audio-visual baseline within the SPA; and displacement of recreational activities to the SPA due to construction works in SANG sites.



- 7.5.11 With respect to changes in the audio-visual baseline, potentially disturbing construction works within the Thames Basin Heaths SPA would be undertaken between 1 October and 31 January unless otherwise agreed with Natural England (G38). As concluded in the Habitats Regulations Assessment (**application document 6.5**), on the application of this measure,

'...and other relevant good practice measures during construction, no impacts are predicted that could result in an adverse effect on the structure or ecological functioning of the site or the Conservation Objectives that define the favourable status of the qualifying features. The ecological function of supporting habitats within the SPA, such as those used for nesting, breeding or roosting, or the availability of prey species, would be maintained.'

- 7.5.12 The short duration and limited extent of works within SANGs is considered to reduce the risk of significant levels of recreational displacement to the SPA. Information presented in the HRA Report about each SANG impacted by the project and the presence of alternative unaffected spaces within 5km of affected SANGs further establishes a low risk of significant recreational displacement occurring. Any effects experienced are anticipated to be minor as the relative impact of a marginal increase in visitor numbers to established footpaths would be small. As such, no impacts are predicted that could result in an adverse effect to the site's integrity.
- 7.5.13 The conclusion of the study was that there would be no adverse effects on the integrity of the Thames Basin Heaths SPA as a result of the project, either alone or in combination with other plans or projects.

Thursley, Ash, Pirbright and Chobham SAC

- 7.5.14 Potential source-receptor pathways for effects to the Thursley, Ash, Pirbright and Chobham SAC identified by the Stage 1 study comprised: direct habitat loss; and indirect loss of Annex I wetland qualifying habitats due to changes to hydrological processes and substrate supporting the vegetation (for example, peats). The Stage 1 assessment concluded that the relatively small area of loss with respect to the 'European dry heaths' feature was not likely to be significant within the context of the wider SAC. The potential for effects to the Annex I wetland qualifying habitats within the site were advanced to Stage 2 Appropriate Assessment.
- 7.5.15 Detailed botanical and vegetation survey and a hydrogeological study of the SAC were undertaken in 2018 to support the Stage 2 study. The findings of this work demonstrated that the pipeline route selected would avoid adverse effects to the integrity of the SAC. In particular, the route selection was such that direct and indirect interaction with Annex I wetland qualifying habitats would be avoided entirely or reduced to the 'trivial level' permissible in the Conservation Objectives.
- 7.5.16 Measures proposed with respect to the preservation of substrate qualities was considered sufficient to conclude that there would be no adverse effects to the integrity of the SAC due to changes to the physical-chemical properties of the substrate.
- 7.5.17 Table 7.15 details statutory designated sites for which there are pathways to potential significant effects.



7.5.18 Potential impacts to each statutory designated site are assessed in the following paragraphs, ordered geographically from southwest to northeast along the route.

Solent and Southampton Water SPA and Ramsar, Solent and Dorset Coast pSPA, and Solent Maritime SAC (and Upper Hamble Estuary and Woods SSSI)

7.5.19 These sites are considered together as they overlap geographically and share common receptors: birds and aquatic habitats. The potential impact pathways identified for these sites comprise the following and are each detailed, in turn:

- Hydrological change – surface water contamination; and
- Species disturbance.

7.5.20 The Order Limits are located, at their closet point, 1.85km from the SPA/SAC/Ramsar/SSSI boundary.

Hydrological Change – Surface water Contamination

7.5.21 Potential hydrological changes are detailed in Chapter 8 Water and include a predicted change to surface water quality within affected watercourses.

7.5.22 A hydrological link to these sites is established where the Order Limits cross two small tributaries of the River Hamble in Section A: a Main River known as Ford Lake Stream (WCX002a) at SU 51575 14739 near Boorley Green 2.2km due northwest and upstream of the SPA/SAC/Ramsar; and, an unnamed watercourse (WCX006) at SU 53575 17990 in Wintershill, 6km northeast and upstream of the SPA/SAC/Ramsar.

7.5.23 The project has very low potential to generate minor contamination to ground- and surface water bodies during construction activities, for example through accidental spillages or release of sediment. As the Order Limits cross tributaries of the River Hamble upstream of these designated sites, there is a theoretical pathway for effects to occur to them. This could cause destruction or damage of qualifying habitats and habitats supporting qualifying/interest features.

7.5.24 The installation of the proposed pipeline below the tributary of the River Hamble at Ford Lake Stream would be achieved by trenchless techniques (TC001). This would reduce the risk of surface water contamination as machinery would be working at distance from the watercourse.

7.5.25 The proposed crossing of the watercourse in Wintershill (WCX006) would be achieved by open cut techniques. However, good practice measures set out in the REAC and secured through DCO requirements such as the CoCP would reduce the risk to watercourses.

7.5.26 For open cut watercourse crossings and installation of vehicle crossing points, mitigation measures would include to (G122):

- 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.

7.5.27 In addition:

- 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 (G11);
- 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) (G12);
- appropriate buffer zones would be established within Order Limits adjacent to identified watercourses (G39),
- potentially hazardous materials used during construction would be safely and securely stored including use of secondary containment where appropriate (G119);
- 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 (G121); and
- fuels, oils and chemicals would be stored responsibly, away from sensitive water receptors. They would be stored >15m from watercourses, ponds and GWDTE (G142).

7.5.28 The two watercourses (WCX002a and WCX006) that would be crossed by the Order Limits are very small in comparison to the large freshwater and estuarine systems that comprise these designated sites (e.g. the SAC has an area of 11,243 ha). There would also be a large distance between these sites and any point of any discharge to the watercourses crossed by the Order Limits.

7.5.29 Furthermore, as the qualifying habitats and species of the statutory designated sites are dependent upon hydrological, geomorphological and/or marine processes (flooding of grazing marshes, tidal and fluvial dynamics) that operate over a much larger scale than that of the project, any hydrological modifications to the

watercourses should they occur as a result of the project, are considered not likely to have a significant effect on the statutory designated sites.

- 7.5.30 Given the above, the risk of hydrological changes, including contamination, affecting the designated sites during construction of the project is considered to be extremely low. As such, the potential impact is of negligible magnitude and negligible significance.

Species Disturbance

- 7.5.31 The qualifying features of the SAC and SSSI are not considered to be sensitive to disturbance and so are scoped out of this assessment.
- 7.5.32 For the duration of construction of the project there would be potential changes to noise and visual stimuli generated by movement of plant and personnel within the construction area, excavation and other groundworks, and transport. Anthropogenic noise and visual changes can have disturbance effects on bird species, resulting in both behavioural and population changes. The potential impacts of noise and visual disturbance to the bird interest features of the SPA and Ramsar due to the project are therefore considered.
- 7.5.33 There is no current authoritative guidance on how far a noise study area should extend from construction activities due to the variability of the potential noise generating activities and plant used. However, based on professional judgement, the effects of noise (as well as visual/human presence) are only likely to be significant where the Order Limits extend within or is directly adjacent to the boundary of the site, or within/adjacent to an offsite area of known foraging, roosting or breeding habitat that supports mobile animal species for which the site is designated.
- 7.5.34 Given the above, the project is considered sufficiently distant from the SPA/Ramsar (1.85km) and project activities sufficiently minor in their potential to generate significant disturbance events (e.g. there would be no rock blasting or other controlled explosions, piling) that noise disturbance is unlikely to have any effect on bird interest features within these sites. Similarly, at such a distance visual disturbance to the SPA/Ramsar would not be expected to result from project activities.
- 7.5.35 Outside the SPA, the Order Limits and adjacent landscape supports arable fields, agricultural and other grassland habitats. Although the SPA/Ramsar supports predominantly coastal and freshwater wetlands and marine habitats the following qualifying species use terrestrial inland habitats for foraging and roosting during the winter: brent goose, lapwing (*Vanellus vanellus*), grey plover (*Pluvialis squatarola*) and curlew (*Numenius arquata*). There could therefore be the potential for disturbance to arise to qualifying species of the SPA/Ramsar using such habitats.
- 7.5.36 The core and potential roosting and foraging zones of qualifying species of the SPA have been mapped by the Solent Waders and Brent Goose Strategy (Solent Waders and Brent Goose Strategy, 2017). The Order Limits fall outside these zones. Any effect of disturbance, therefore, would likely be insignificant. Moreover, suitable habitat such as arable fields are abundant in the landscape around the route. As



such, any qualifying species of the SPA/Ramsar present outside these zones that may be temporarily displaced for the duration of the project would likely find suitable alternative resource nearby without detriment to SPA/Ramsar populations.

- 7.5.37 Any other indirect disturbance pathways, such as visual disturbance due to changes to landscape structure during construction that would be visible from the air during migration, are likely to be insignificant due to the small scale and temporary nature of the project in the context of the wider landscape.
- 7.5.38 As such, the potential impact would be of negligible magnitude and negligible significance.

Table 7.16: Summary of Potential Impacts on Biodiversity - Solent and Southampton Water SPA and Ramsar, Solent and Dorset Coast pSPA, and Solent Maritime SAC (and Upper Hamble Estuary and Woods SSSI)

Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Solent and Southampton Water SPA and Ramsar, Solent and Dorset Coast pSPA, Solent Maritime SAC and Upper Hamble Estuary and Woods SSSI	Hydrological change – surface water contamination	High	Negligible	Negligible
	Species disturbance	High	Negligible	Negligible

Bourley and Long Valley SSSI

- 7.5.39 Bourley and Long Valley SSSI is a component SSSI of the Thames Basin Heaths SPA, designated for its breeding bird populations of Dartford warbler, nightjar and woodlark. In addition, the SSSI is specifically designated for the following notified features: breeding hobby; invertebrate assemblage; and H2 - *Calluna vulgaris* - *Ulex minor* heath, M16 - *Erica tetralix* - *Sphagnum compactum* wet heath, M21 - *Narthecium ossifragum* - *Sphagnum papillosum* mire and M25 - *Molinia caerulea* - *Potentilla erecta* mire vegetation communities. The SSSI covers an area of 823ha.
- 7.5.40 Preliminary construction drawings illustrating the proposed construction works within the SSSI are provided on figure 7.6, Figure 7.7 and Figure 7.12.
- 7.5.41 The total length of the route through Bourley and Long Valley SSSI is approximately 1.5km, from where it enters the site north of Tweseldown Racecourse (SU 82425 52308) and exits at the location of the trenchless crossing of the A323 and Basingstoke Canal (TC013) (SU 83298 53508). The SSSI units within the Order Limits within Bourley and Long Valley SSSI are Units 4, 2 and 1 (south to north).
- 7.5.42 Within Unit 4, habitats comprise a large open area of amenity grassland at Tweseldown Racecourse. Within Unit 2, habitat within the vicinity of the route comprises purple moor-grass dominated grassland along an existing pipeline easement, a footpath between Tweseldown Racecourse and Aldershot Road to the northeast, and broadleaved semi-natural and coniferous plantation woodland. Beyond the Order Limits, there is a large area of heathland to the east within Unit 2, supporting dry and wet dwarf shrub heath and valley mire.
- 7.5.43 The Order Limits exit Unit 2, cross Aldershot Road, and enter a car park on the boundary of Unit 1. From here, the pipeline would be constructed using trenchless



techniques (TC011 and TC012), although a drilling compound would be required at the interface between an area of wet heath and wet woodland, approximately 320m from the car park. As the route continues northeast through the unit, the higher ground is dominated by broadleaved woodland and coniferous plantation.

- 7.5.44 It was not possible to route the pipeline along an existing trackway as this access route may be required by the MoD for future tank training exercises.
- 7.5.45 Construction within Bourley and Long Valley SSSI would be in accordance with Annex B of the Habitats Regulations Assessment. Where necessary, detailed methodologies would be agreed with Natural England prior to commencement. All construction works would be in accordance with the detailed methodologies (G61).
- 7.5.46 The proposed method of working seeks to avoid or reduce impacts to soils, vegetation and notable species through the following embedded or good practice measures:
- avoidance of direct impacts to wet heath and wet woodland habitat through the use of trenchless construction techniques (TC011 and TC012);
 - working width reduced to 15m to limit impacts on trees and potential bat roosts within Bourley and Long Valley SSSI. This consists of two areas with an approximate combined distance of 293m (Grid refs: SU82401 52247 to SU82449 52310, and SU83073 53223 to SU83200 53396) (NW11 and NW13 on Figure 7.5);
 - 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: SU82689 52650 to SU82698 52721) (NW12 on Figure 7.5);
 - 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 (G48);
 - where works in wet heath would be unavoidable, effects on soils and surface vegetation would be reduced through the use of ground protection matting and appropriate machinery where practicable (G51);
 - at heathland SSSIs, targeted scrub and secondary woodland within the Order Limits would be removed. Subject to landowner consent, these areas would be reinstated as heathland or acid grassland through natural regeneration (HRA2);
 - topsoil stripping would be reduced to a minimum extent within European sites and SSSIs except where identified within the HRA (some unavoidable stripping would take place as part of the trenching for the pipeline and in construction compounds where matting is not a workable alternative) (HRA4);
 - where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that



construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40); and

- heathland within statutory or non-statutory designated wildlife sites would be reinstated using natural regeneration, unless otherwise agreed with Natural England (HRA1).

7.5.47 The potential impact pathways identified for Bourley and Long Valley SSSI comprise the following and are each detailed, in turn:

- habitat loss/gain, fragmentation or modification;
- introduction/spread of INNS;
- species mortality/injury;
- species disturbance;
- hydrological changes to groundwater dependent terrestrial ecosystems;
- hydrological change – surface water contamination; and
- air quality changes – dust deposition.

Habitat Loss/Gain, Fragmentation or Modification

i) Notified habitat features of the SSSI and other habitats

7.5.48 The Order Limits comprise an area of approximately 7.65ha as it crosses Bourley and Long Valley SSSI. The proposed route and construction techniques proposed have been designed to reduce impacts to heathland habitat interest features of the SSSI, particularly wet heath and wet woodland. However, the following Priority Habitats and Annex I habitats are within the Order Limits in the SSSI:

- Priority Habitats:
 - Lowland Dry Acid Grassland;
 - Lowland Fens;
 - Lowland Heathland;
 - Lowland Mixed Deciduous Woodland;
 - Purple Moor-grass and Rush Pastures; and
 - Wet Woodland.
- Annex I habitats:
 - H4010 Northern Atlantic wet heaths with *Erica tetralix*;
 - H4030 European dry heaths;
 - H7150 Depressions on peat substrates of the *Rhynchosporion*; and
 - H9190 Old acidophilous oak woods with *Quercus robur* on sandy plains.

7.5.49 Detailed plans showing the location and extent of these habitats are provided on figure A7.1.94 to A7.1.96 in Appendix 7.1 Habitats and Botany Factual Report.



- 7.5.50 The project would affect habitat within the SSSI, with installation of the pipeline within the Order Limits requiring excavations and clearance of vegetation. Excavations would mostly be by open cut although trenchless horizontal directional drilling would be used for two sections within the SSSI (TC011 and TC012) to reduce impacts to wet heath and wet woodland habitat.
- 7.5.51 Vegetation clearance would be required in advance of construction works (where these areas were vegetated) to facilitate the movement of construction plant and to displace wildlife from the working area (e.g. reptiles). Construction activity would be restricted to existing tracks as far as possible, but habitat adjacent to the track would be temporarily removed to allow for additional working areas where these could not be accommodated within tracks.
- 7.5.52 To reduce potential impacts on ecological receptors at the SSSI, the construction working methods have been adapted at specific locations to take account of individual ecological receptors (Figure 7.6, Figure 7.7 and Figure 7.12). For example, where open cut is proposed, the working width would be narrowed to reduce potential impacts on broadleaved woodland and SSSI habitats and trenchless construction techniques would be adopted to avoid impacts to wet heath and wet woodland habitats.
- 7.5.53 To further protect heathland habitat and to reduce potential ground disturbance, topsoil stripping would be reduced to a minimum extent within European sites and SSSIs except where identified within the HRA (some unavoidable stripping would take place as part of the trenching for the pipeline and in construction compounds where matting is not a workable alternative) (HRA4).
- 7.5.54 Vegetation clearance and trench excavations would predominantly impact acid grassland and dry heath, resulting in a temporary loss of these habitats. Some removal of broadleaved woodland and conifer plantation would also be necessary.
- 7.5.55 Vegetation arisings would be disposed of responsibly. Small quantities may be reused on site to create ecological habitat (G62); this would benefit invertebrates and reptiles. A Site Waste Management Plan (SWMP) would be developed prior to construction. The contractor(s) would maintain and monitor the SWMP throughout the construction period and oversee that any sub-contractor(s) adhere to the SWMP (G77).
- 7.5.56 Topsoils and subsoils intended for reinstatement would be temporarily stockpiled as close to where they were stripped from as practicable (G155) and different soil types and made ground would be stripped and stored separately where applicable (G159). A methodology would be produced for stripping, handling, storage and replacement of all soils to reduce risks associated with soil degradation. This would include (G151):
- identification of appropriate plant to strip, reinstate and otherwise handle soils;
 - methods for compaction and grading of stockpiles;
 - methods for working in naturally wet soils; and
 - specification of appropriate decompaction measures to be used during reinstatement.



- 7.5.57 Following substrate reinstatement, heathland within statutory or non-statutory designated wildlife sites would be reinstated using natural regeneration, unless otherwise agreed with Natural England (HRA1). Soil disturbance and natural regeneration is consistent with standard conservation measures for the restoration and management of heathland, and there is a high degree of confidence that disturbed habitats could be reinstated as pioneer heathland or acid grassland in the short to medium term by these methods (Gimingham, 1992).
- 7.5.58 To avoid potential direct impacts to wet heath and wet woodland, which are considered the most sensitive SSSI habitats within the Order Limits, embedded measures in the form of trenchless construction techniques would be implemented (TC011 and TC012). This would likely involve horizontal directional drilling below ground. Furthermore, where works in wet heath would be unavoidable, effects on soils and surface vegetation would be reduced through the use of ground protection matting and appropriate machinery where practicable (G51). The embedded and good practice measures would see that the risk of habitat loss to wet heath areas is avoided or reduced during construction.
- 7.5.59 Trenchless crossing techniques would avoid surface impacts on approximately 1.91ha of habitat within the SSSI. Where excavation is required, narrow width working (NW12 and NW13, see Figure 7.5) would further reduce the total surface impact by approximately 1.08ha. In addition, approximately 1.6ha within the Order Limits at Bourley and Long Valley SSSI is allocated for ecological mitigation, as required (e.g. good practice measures HRA2 or G62, as set out in the REAC). No construction works would occur in these areas. Of the approximately 7.65ha of land within the Order Limits at Bourley and Long Valley SSSI, approximately 3.06ha would be directly impacted by construction activities. This comprises approximately 0.3% of the SSSI as a whole.
- 7.5.60 In conclusion, taking account of the embedded design and good practice measures, and the small areas of habitats within the Order Limits relative to total areas within the wider SSSI, the potential impact is of small magnitude and minor adverse significance.
- ii) *Notable plants*
- 7.5.61 Temporary habitat loss within the Bourley and Long Valley SSSI would result in the direct loss of individuals of notable plants species creeping willow, common wintergreen and bog myrtle. Although notable, bog myrtle was not exclusively recorded within the Order Limits and it can be reasonably assumed that the proportion of the populations of bog myrtle potentially lost would not be significant compared to populations across the SSSI as a whole.
- 7.5.62 Creeping willow and common wintergreen were rare both in the Order Limits and in the wider survey area. Both were recorded, singularly, between Tweseldown racecourse and Aldershot Road. Creeping willow was additionally recorded within the Order Limits approximately 150m north of Aldershot Road. Common wintergreen is also associated with coniferous woodland and could be present in these habitats where coniferous woodland clearance is proposed to facilitate heathland regeneration (see Figure 7.12).



- 7.5.63 The area of temporary habitat loss within the Bourley and Long Valley SSSI that support notable plant species would be limited as topsoil stripping would be reduced to a minimum extent within European sites and SSSIs except where identified within the HRA (some unavoidable stripping would take place as part of the trenching for the pipeline and in construction compounds where matting is not a workable alternative) (HRA4). In addition, where works in wet heath would be unavoidable, effects on soils and surface vegetation would be reduced through the use of ground protection matting and appropriate machinery where practicable (G51).
- 7.5.64 Combined, these measures would reduce impacts to soil structure, preserve the seedbank, maintain the plant communities present, and limit changes to the nutrient balance of the habitat. Although plant communities underneath any ground protection measures would be compacted and damaged, they would not likely be destroyed because such works would be undertaken during the plant dormant period (as required by good practice measure G38, necessary for breeding birds) and some degree of regeneration and re-establishment could be reasonably anticipated in the medium term. However, regeneration of both species is complex and they do so vegetatively by rhizomes, rather than distribution of seed.
- 7.5.65 Due to the rarity and uncertainty as to the regeneration capabilities of common wintergreen and creeping willow, good practice measures would be implemented. Individual plants of creeping willow (*Salix repens*) and common wintergreen (*Pyrola minor*) at Bourley and Long Valley SSSI, where likely to be affected by construction, would be translocated into suitable receptor locations within the Order Limits where practicable. The location of the receptor site would be determined by the Environmental Clerk of Works (ECoW) and protected by an appropriate buffer during the pipeline construction period (G55).
- 7.5.66 Taking into account the small area of habitat affected compared to the overall size of the SSSI, the low number of plants recorded within the Order Limits, and the good practice measures described, the potential impact of temporary habitat loss on notable plant species within Bourley and Long Valley SSSI is of small magnitude and minor adverse significance.

Habitat Supporting Faunal Interest Features of the SSSI

- 7.5.67 Temporary loss of habitat within the Bourley and Long Valley SSSI has the potential to affect species of fauna that are interest features of the SSSI and qualifying features of the Thames Basin Heaths SPA, of which the SSSI is a component, specifically: breeding birds (Dartford warbler, nightjar and woodlark as qualifying features of the Thames Basin Heaths SPA, and hobby); heathland specialist terrestrial invertebrates; and adder.

i) Breeding birds

- 7.5.68 Dartford Warblers are found almost exclusively in lowland dry heathland with a mix of heather, trees and gorse (*Ulex* spp.) (Wotton, 2009). Birds nest close to the ground (JNCC, 2014) and require an abundance of shrub-layer invertebrates. Extensive unbroken dwarf shrub heath of mature heather interspersed with low to medium height gorse represents optimum breeding habitat. Undamaged, healthy gorse provides protection from harsh weather during winter, and from predators



(Murison *et al.*, 2007). Dartford warbler breeds between April and August inclusive and is most vulnerable to disturbance during this period.

- 7.5.69 The nightjar is a ground-breeding bird associated with dry heathland habitat. Known habitat preferences include open ground with low vegetation, bare patches and sparse woodland/scrub cover. Scattered trees are used for roosting. Nightjar can forage several kilometres from their nesting territory (Natural England, 2016). Nightjar breed in the UK between May and September inclusive, nesting within gaps in deep heather on dry heath, often at the edge of woodland or heathland (JNCC, 2004). Chicks are raised in secluded patches of bare ground within shrubby vegetation. Nightjar migrate in August or September, over-wintering in sub-Saharan Africa, and return to the UK in May (Natural England, 2016).
- 7.5.70 Woodlark is strongly associated with heathland habitat, nesting on the ground in shallow scrapes, often at the edge of woodland. Woodlarks require a mix of scrub/tree cover and sparsely vegetated land with bare ground and an abundance of invertebrates (Natural England, 2016). Higher numbers of birds are associated with areas where vegetation has been manually cleared, or burnt (2Js Ecology, 2016). Tussocky vegetation is required for nesting (Natural England, 2016). Woodlark also forage on land adjacent to heathland, which can include grassland and fields outside the SPA boundary, as well as using open areas such as wide rides and breaks in plantations (Natural England, 2016). The core breeding season for woodlark is between February and June inclusive, but the birds are likely to be present within the SPA in lower numbers outside these months (Natural England, 2016).
- 7.5.71 Hobby prefer areas of heathland, arable land and woodland edges especially in areas close to water. However, hobby may no longer be dependent on traditional heathland nest sites (Hawk and Owl Trust, 2019). In the 2011 SSSI condition report, hobby was recorded as present in Units 1 and 2 of the SSSI but not confirmed as breeding (Natural England, undated a). In Britain, the hobby is the only falcon that spends the winter months south of the Sahara desert. Birds can be seen in the UK between late March and late October. Hobbies always use the stick nests of other species, crow's nests are favoured but the nests of sparrowhawk, buzzard and grey heron have also been used (British Trust for Ornithology, undated).
- 7.5.72 Desk study evidence indicates that the area of the SSSI through which the Order Limits would pass has occasionally supported breeding territories of low numbers of Dartford warbler, nightjar and woodlark.
- 7.5.73 Within Unit 4, desk study data indicate some use of the area by all three SPA species, but there is an apparent preference for the more open area within Tweseldown Racecourse to the east of the Order Limits. Suitable breeding areas for woodlark and nightjar have declined in this unit, but a few birds have fledged young in the past (Natural England, 2016). Desk study data (2008-2018) identified breeding territories overlapping with the Order Limits in Unit 2 at the base of Aunt's Pool Hill for Dartford warbler (in 2016), nightjar (in 2008, 2015 and 2016) and woodlark (in 2011, 2013 and 2015) (2Js Ecology, 2018). Full information with respect to breeding territory locations is provided in the project's HRA Report (**application document 6.5**).



- 7.5.74 As described above, the area of habitat within the SSSI that would be temporarily lost as a result of construction is small compared to the total area of the SSSI and Thames Basin Heaths SPA (0.3% and 0.03%, respectively) and would be further reduced by the embedded and good practice measures described. All loss of habitat suitable for these bird species would be temporary and heathland within statutory or non-statutory designated wildlife sites would be reinstated using natural regeneration, unless otherwise agreed with Natural England (HRA1). The affected habitats are anticipated to re-establish to pioneer heathland within approximately five years.
- 7.5.75 No breeding woodlark and nightjar were recorded using the conifer woodland within the Order Limits between 2008 and 2018 (2Js Ecology, 2018). However, it is possible that hobby could breed in this habitat. Nevertheless, in the event the species were present, plentiful similar habitat remains over the SSSI (approximately 0.3% of the SSSI would be impacted by the project) and so a negligible reduction in potential breeding habitat is predicted. Woodlark prefer 'recently felled conifer plantation' (Natural England, 2018) for breeding. As such, the felling of coniferous woodland may represent an improvement in habitat conditions within the Order Limits for woodlark.
- 7.5.76 With the exception of when working within coniferous woodland (which subject to landowner agreement would not be replaced so as to allow the post-construction regeneration of heathland habitat), the working width would be reduced at all locations within the SSSI and so the entire Order Limits would not be given over to construction activity (Figure 7.12). Even in a hypothetical scenario during which the total 7.65ha area of the SSSI within the Order Limits were temporarily destroyed during construction, it is not anticipated that significant effects to breeding birds would arise given the small area of the total SSSI resource that would be affected. With the exception of conifer woodland, all areas of habitat loss would be temporary and would be reinstated using natural regeneration, unless otherwise agreed with Natural England (HRA1).
- 7.5.77 During the period of regeneration, there would be a large alternative resource of suitable breeding habitat available for bird interest features within the adjacent heathland. This is supported by a desk study of breeding territories of Dartford warbler, nightjar and woodlark (see the HRA Report **application document 6.5**) which shows that these bird species breed in habitats widely distributed across the SSSI, indicating that there is suitable alternative breeding habitat available. Plentiful alternative habitat for breeding hobby would also be available.
- 7.5.78 Given the localised and temporary scale of habitat loss resulting from the project, any potential effects to the breeding bird interest features of Bourley and Long Valley SSSI via temporary habitat loss is of small magnitude and minor adverse significance.
- ii) *Terrestrial invertebrates (heathland specialists)*
- 7.5.79 The Bourley and Long Valley SSSI citation lists five invertebrate species: the nationally rare hoverfly *Pelecocera tricincta*; mottled bee-fly (*Thridanthrax fenestratus*); the nationally scarce downy emerald dragonfly (*Cordulia aenea*); heath

potter wasp (*Eumenes coarctatus*); and silver-studded blue (*Plebejus argus*). The silver-studded blue is a Priority Species.

- 7.5.80 *Pelecocera tricincta* is a small hoverfly associated with the margins of bogs, wet heaths, mires and heathlands. The downy emerald dragonfly has a scattered distribution across the UK (British Dragonfly Society, 2018). Breeding habitat comprises ponds with sparse emergent vegetation, close to deciduous woodland. The heath potter wasp is associated with heathland and quarries. It requires areas of bare clay in proximity to water, which it uses to build nests ('pots') on heathers and gorse during the summer (Bees, Wasps & Ants Recording Society, 2018). Larvae pupate and emerge as adults during the summer or overwinter within their pots. The silver-studded blue has a restricted distribution and has undergone a major decline through most of its range (Butterfly Conservation, 2018). It occurs in heathland, sand dunes and chalk/limestone grassland, where it can occur in large numbers. Caterpillars are present from March to June and pupate during June, before emerging as adults during July and August. Eggs are laid on and larvae feed on a variety of plants, such as heather, bell heather (*Erica cinerea*), cross-leaved heath (*E. tetralix*) and gorses (*Ulex* spp.).
- 7.5.81 The Order Limits within the SSSI support habitat suitable for the above species during all stages of their life cycles, including areas with abundant dwarf shrubs for larval stages, flower-rich areas for nectar feeding adult insects and open areas likely rich in invertebrate prey for the predatory downy emerald, and areas of bare earth for the heath potter wasp. There are some seasonally wet ponds within the Order Limits to the north of Aldershot Road (Figure 7.4), which could be used by downy emerald. Most of this suitable habitat within the Order Limits is within the areas of wet heath to the north of Aldershot Road. Habitat to the south is less suitable, predominantly comprising mown grassland with short and scattered dwarf subshrubs.
- 7.5.82 As the Order Limits support habitat suitable for the invertebrate interest of the SSSI, there is a potential impact by habitat loss/modification due to clearance of vegetation used as foodplants by larvae and for nectar feeding by adults. However, as described above, optimal habitat within the Order Limits is restricted, and the total area of heathland habitat within the Order Limits potentially affected by vegetation clearance is small compared to that within the SSSI as a whole (approximately 0.3%). In the context of this much larger resource, the loss of suitable habitat within the Order Limits is therefore unlikely to adversely affect the invertebrate interest of the SSSI. Moreover, as described above, the loss of habitat within the Order Limits would be temporary and reversible.
- 7.5.83 Earth banks within SSSIs which are likely to be of importance for common reptiles and invertebrates would be avoided and protected, where practicable. If their removal is unavoidable during construction, the banks should be reinstated (G57).
- 7.5.84 Furthermore, at heathland SSSIs, targeted scrub and secondary woodland within the Order Limits would be removed. Subject to landowner consent, these areas would be reinstated as heathland or acid grassland through natural regeneration. (HRA2). This would provide a habitat improvement for heathland invertebrates within the Order Limits.



- 7.5.85 Given the small, localised and temporary loss of suitable habitat, the potential effect to the invertebrate feature of the SSSI is of negligible magnitude and minor adverse significance.
- iii) Adder*
- 7.5.86 Adder prefer woodland and heathland habitats. They hunt lizards and small mammals, as well as ground-nesting birds. Adders hibernate from October, emerging in early March. Adders have a high degree of site fidelity, more so than other reptiles. This is particularly true of hibernation areas (Gleed-Owen and Langham, 2012), making them more vulnerable to stochastic effects than other reptiles.
- 7.5.87 Habitat suitable for reptiles that may be temporarily lost due to installation of the pipeline comprises approximately 0.03ha of marshy grassland, 0.01ha of heathland and 350m of coniferous woodland edge (see Figure 7.4). A reduction in available habitat would potentially affect the physical condition of individuals or their ability to reproduce successfully. However, in the context of the wider landscape, these habitats are common and widespread and the area potentially lost is comparatively small compared to similar, adjacent retained habitats. The removal of these habitats would be temporary and would become suitable for adder following their reinstatement.
- 7.5.88 Hibernacula are important habitat features for adder which often hibernate in large groups at sites to which they are faithful year-on-year. Pre-construction surveys would be completed if existing baseline survey data need to be updated or supplemented (G33) to identify the location of any hibernacula present within the Order Limits. Adder hibernacula would be retained and protected during construction where practicable. If unavoidable, the removal of vegetation and groundworks at hibernacula would be timed to avoid the hibernation season (G52). If removal was unavoidable, replacement hibernacula and refugia would be provided within the Order Limits to mitigate habitat loss to reptiles and amphibians (G53). Whiting and Booth (2012) detail how provision of hibernacula, designed with a focus on adder, can be successful replacement habitats.
- 7.5.89 In addition, earth banks within SSSIs which are likely to be of importance for common reptiles and invertebrates should be avoided and protected, where practicable. If their removal is unavoidable during construction, the banks should be reinstated (G57).
- 7.5.90 Furthermore, targeted scrub and secondary woodland within the Order Limits would be removed. Subject to landowner consent, these areas would be reinstated as heathland or acid grassland through natural regeneration (HRA2). This would provide a habitat improvement for adder within the Order Limits.
- 7.5.91 Given the above, the potential impact on adder is of small magnitude and minor adverse significance.



Introduction/Spread of INNS

- 7.5.92 The presence of INNS has been confirmed at Bourley and Long Valley SSSI: montbretia (*Crocsmia x crocosmiiflora*); and Portugal laurel (*Prunus lusitanica*) were recorded within the Order Limits, with *Rhododendron* recorded in the wider site (Appendix 7.4 Invasive Non-Native Plant Species Factual Report). Any further introduction or spread of INNS could potentially cause significant adverse effects to habitat and species supported by these habitats due to the dominance that INNS can have over native species. Areas of potential risk from INNS within the Order Limits are detailed in Appendix 7.4 Invasive Non-Native Plant Species Factual Report. Pre-construction surveys would be completed if existing baseline survey data need to be updated or supplemented (G33).
- 7.5.93 During installation, there is potential for soil to be moved around designated sites, and therefore the potential for INNS to be introduced or spread via contaminated machinery or soil. There is also a risk of transferral from pedestrian movement and worker vehicles. Working alongside ditches and drains would also be required, with the potential to cause introduction or spread of INNS within the aquatic environment.
- 7.5.94 The potential spread of INNS would be controlled through good practice measures set out in the REAC. A suitable methodology would be produced to set out how identifiable areas with the potential presence of Schedule 9 plant species or other invasive species would be demarcated, and how any affected soils would be appropriately managed throughout the works (G42).
- 7.5.95 The risk of spreading INNS would be further reduced through previously described measures that would reduce ground disturbance and vegetation removal e.g. reduction in topsoil stripping (HRA4), use of ground protection matting (G51), the use of trenchless construction techniques below wetland areas (TC011 and TC012), and reducing the working width (Figure 7.5). Furthermore, topsoils and subsoils intended for reinstatement would be temporarily stockpiled as close to where they were stripped from as practicable (G155).
- 7.5.96 Given the above measures, the potential impact of introduction/spread of INNS is of negligible magnitude and negligible significance.

Species Mortality/Injury

- 7.5.97 The process of vegetation removal within Bourley and Long Valley SSSI has the potential to kill or injure species of fauna that are interest features of the SSSI and qualifying features of the Thames Basin Heaths SPA, of which the SSSI is a component: breeding birds (Dartford warbler, nightjar and woodlark as qualifying features of the Thames Basin Heaths SPA, and hobby); heathland specialist terrestrial invertebrates; and adder.

i) Breeding birds

- 7.5.98 There is a project commitment that potentially disturbing construction works within the Thames Basin Heaths SPA (and therefore the Bourley and Long Valley SSSI) would be undertaken between 1 October and 31 January unless otherwise agreed



with Natural England (G38). This would avoid the period during which birds would be breeding.

- 7.5.99 Minor works in potential breeding habitats but that would not result in mortality/injury to breeding birds may be undertaken outside this period subject to approval from Natural England e.g. pre-construction surveys, maintenance mowing of cleared vegetation to deter reptiles, dismantling of reptile hibernacula.
- 7.5.100 Construction works elsewhere within the SPA/SSSI may be undertaken if the habitats are unsuitable for the qualifying features e.g. in areas of dense or continuous woodland.
- 7.5.101 However, 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 (G35).
- 7.5.102 As such, the potential impact of injury/mortality to breeding birds is of negligible magnitude and negligible significance.

ii) Terrestrial invertebrates (heathland specialists)

- 7.5.103 As described above, the Bourley and Long Valley SSSI citation lists five invertebrate species. The habitat preferences of these species and the distribution of suitable habitat within the Order Limits are also described.
- 7.5.104 Given the seasonal working constraints of construction within the SSSI (i.e. G38), the life cycles of the above species mean that there is unlikely to be a potential impact by injury/mortality of adults during construction. During the period of construction works, individuals are most likely to be in a dormant stage, present as eggs or larvae within vegetation, or in ponds in the case of the downy emerald.
- 7.5.105 Individuals in juvenile stages present within vegetation could be injured or killed during vegetation clearance during construction. However, earth banks within SSSIs which are likely to be of importance for invertebrates would be avoided and protected, where practicable. If their removal is unavoidable during construction, the banks should be reinstated (G57). In addition, topsoil stripping would be reduced to a minimum extent within European sites and SSSIs except where identified within the HRA (some unavoidable stripping would take place as part of the trenching for the pipeline and in construction compounds where matting is not a workable alternative) (HRA4). This would reduce the extent of potential impact.
- 7.5.106 Given the small extent of suitable habitat (approximately 3.06ha) that would be affected by vegetation clearance relative to the total resource within the SSSI (823ha), the number of individuals potentially injured or killed by construction works is unlikely to be significant for the favourable status of the populations of the species that form the invertebrate feature of the SSSI.

7.5.107 As such, the potential effects to the invertebrate feature of the SSSI resulting from mortality or injury is of small magnitude and minor adverse significance.

iii) Adder

7.5.108 All activities that involve the clearance of areas containing suitable reptile habitat in Bourley and Long Valley SSSI, such as heathland, woodland edges and refugia (see Figure A7.11.2 in Appendix 7.11 Reptile Factual Report), could result in mortality and injury of adder.

7.5.109 Good practice measures would be implemented to reduce the risk of mortality and injury. Adder hibernacula would be retained and protected during construction where practicable. If unavoidable, the removal of vegetation and groundworks at hibernacula would be timed to avoid the hibernation season (i.e. assumed to be mid-October to mid-March) (G52).

7.5.110 Furthermore, good practice measures to avoid or reduce impacts to reptiles would be implemented in accordance with the REAC. Appendix 7.17 Protected and Controlled Species Legislation Compliance Report further considers the specific requirements on the project of EU and national protected species legislation. All habitats suitable for common reptiles would be subject to two-stage habitat manipulation between mid-March and mid-October. Firstly, vegetation would be cut to approximately 150mm (with the arisings removed) under the supervision of an ECoW and the site left for a minimum of two days to allow reptiles to move away from the area. Secondly, vegetation would be cleared down to ground level under the supervision of an ECoW. Vegetation clearance would be achieved using appropriate hand tools based on the type of vegetation to be removed, the area affected, and the risk of killing or injuring reptiles. Construction works could commence immediately after completion of the second stage (G196).

7.5.111 Based on the implementation of good practice measures, the potential impact is of negligible magnitude and negligible significance.

Species Disturbance

7.5.112 Changes to noise, vibration, visual and light stimuli during the construction works within Bourley and Long Valley SSSI has the potential to disturb species of fauna that are interest features of the SSSI and qualifying features of the Thames Basin Heaths SPA, of which the SSSI is a component: breeding birds (Dartford warbler, nightjar and woodlark as qualifying features of the Thames Basin Heaths SPA, and hobby); heathland specialist terrestrial invertebrates; and adder.

i) Breeding birds

7.5.113 A detailed assessment with respect to disturbance to the qualifying features of the Thames Basin Heaths SPA is provided in the project's HRA Report.

7.5.114 There is a project commitment that potentially disturbing construction works within the Thames Basin Heaths SPA would be undertaken between 1 October and 31 January unless otherwise agreed with Natural England (G38).



- 7.5.115 Minor and short-duration works in potential breeding habitats but that would not result in disturbance to breeding birds may be undertaken outside this period subject to approval from Natural England e.g. pre-construction surveys, maintenance mowing of cleared vegetation to deter reptiles, dismantling of reptile hibernacula.
- 7.5.116 Construction works within the Bourley and Long Valley SSSI would not be subject to seasonal constraints where these would take place within habitats that are unsuitable for breeding woodlark, nightjar and Dartford warbler e.g. dense conifer plantation or areas of broadleaved woodland. However, the assumption would be that vegetation with the potential to support bird nests would not to 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 (G35).
- 7.5.117 Artificial lighting has the potential to impact the night flying nightjar by creating artificial barriers and creating avoidance behaviours. No site compounds are proposed within Bourley and Long Valley SSSI and so lighting would not likely be required. Furthermore, as construction works would avoid the breeding season, any lighting required would not result in disturbance to breeding nightjar or their prey items.
- 7.5.118 As such, the potential impact pathway for significant disturbance to occur on breeding birds of the Thames Basin Heaths SPA and component Bourley and Long Valley SSSI is of negligible magnitude and negligible significance.
- 7.5.119 This is consistent with the HRA Report (**application document 6.5**) which concluded:

'...that on the application of this mitigation, and other relevant good practice measures during construction, no impacts are predicted that could result in an adverse effect on the structure or ecological functioning of the site or the Conservation Objectives that define the favourable status of the qualifying features. The ecological function of supporting habitats within the SPA, such as those used for nesting, breeding or roosting, or the availability of prey species, would be maintained.'

ii) Adder

- 7.5.120 During the construction period, the potential effects to adder within the SSSI caused by disturbance is uncertain. There is no strong evidence that adder is sensitive to disturbance, but there is potential that disturbing activities could cause stress to individual animals and compromise survival and reproduction.
- 7.5.121 By the time disturbing construction activities commence between 1 October and 31 January (G38), any adder within the Order Limits would have dispersed following the implementation of the previously described good practice measure G196.
- 7.5.122 However, the effects of disturbance could be experienced by adder within retained habitats in the immediate vicinity of the Order Limits. As potentially disturbing



construction works within the Thames Basin Heaths SPA would be undertaken between 1 October and 31 January unless otherwise agreed with Natural England (G38), it is likely that any adder within the vicinity of the Order Limits would be hibernating during the installation period.

- 7.5.123 Adder hibernacula would be retained and protected during construction where practicable. If unavoidable, the removal of vegetation and groundworks at hibernacula would be timed to avoid the hibernation season (G52). Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).
- 7.5.124 Further measures to reduce noise and vibration would also be adopted, as set out in the REAC (e.g. G98, G102, G104, and G107). Other good practice measures previously described and specific to reptiles (e.g. G37, G52, G53, G57) would also be implemented. These measures would be secured through DCO requirements such as the CoCP.
- 7.5.125 Given the above, the potential disturbance impact on adder is of small magnitude and minor adverse significance.

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

- 7.5.126 Habitats that are dependent on groundwater levels, flows or quality have been identified within Bourley and Long Valley SSSI, as described in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment. The dependency of habitats on groundwater has been assessed as ranging from high to moderate, to low to moderate (Figure A8.3.17 in Appendix 8.3). The assessment below is based on the results of the assessment of potential effects to GWDTE undertaken in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment.
- 7.5.127 Habitats assessed as having high to moderate groundwater dependency comprise wet dwarf shrub heath, valley mire and wet woodland habitats. To the south of Aldershot Road, only wet woodland habitat is within the Order Limits, supplied by a spring and seepage area at the bottom of a slope (shown on Figure A8.3.16 in Appendix 8.3). Wet dwarf shrub heath and valley mire are located in a topographic low to the northeast of the Order Limits. To the north of Aldershot Road, the northeastern section of the Order Limits is on a hill which does not support groundwater dependent habitats. On lower ground to the west, there are wet dwarf shrub heath and wet woodland habitats within the Order Limits. An area of wet woodland along the Gelvert Stream (shown on Figure A8.3.16 in Appendix 8.3) within the Order Limits is predominantly surface water dependent.
- 7.5.128 Habitats assessed as having low to moderate groundwater dependency comprise marshy grassland along the Order Limits to the south of Aldershot Road. This habitat extends along the existing wayleave from Tweseldown Racecourse northeast to the spring by Aldershot Road.



i) Changes to groundwater levels or flows caused by temporary dewatering

- 7.5.129 In areas where installation would be by open cut and the depth of the trench would intersect the water table, dewatering would be required for the duration of installation at that location. Dewatering could lower groundwater levels and change groundwater flows upon which GWDTE are dependent, leading to potential effects to GWDTE habitats resulting in habitat loss, fragmentation or modification. The depth to the water table would depend on the season during which works take place. However, most of the Order Limits through Bourley and Long Valley SSSI are likely to be within the unsaturated zone. Trenchless crossings are also proposed in key locations (TC011 and TC012) and so dewatering would not likely be required here.
- 7.5.130 However, some localised dewatering would be inevitable and is most likely to be required in the area around the spring to the south of Aldershot Road and in the wet woodland around the Gelvert Stream to the north. As the latter area is predominantly surface water dependent, dewatering is not expected to effect wet woodland there through changes to groundwater. This area does not constitute a notified feature of the SSSI and so the potential effects from dewatering of wet woodland habitat at Bourley and Long Valley SSSI is of negligible magnitude and negligible significance.
- 7.5.131 The habitats supplied by the spring south of Aldershot Road comprise wet woodland and marshy grassland. The marshy grassland habitat comprises vegetation referable to NVC M25 *Molinia caerulea-Potentilla erecta* mire, a notified feature of Bourley and Long Valley SSSI. The duration of effects to this habitat resulting from dewatering would be limited to the period of construction which would be between 1 October and 31 January (unless otherwise agreed by Natural England). Therefore, dewatering would take place when vegetation is dormant, such that the response to a temporarily lowered water table would not be expected to be comparable to that during the growing period.
- 7.5.132 Furthermore, the contractor(s) would ensure that the time the trench is open in the vicinity of certain features, would only be as long as necessary for the installation of the pipeline. The required dewatering of the trench would be undertaken only as and when necessary to enable safe working and preparation for pipe installation (G132). Therefore, dewatering is unlikely to lead to change in the vegetation such that it would no longer form this feature of the site. As such, the potential effect due to dewatering on marshy grassland at Bourley and Long Valley SSSI is of small magnitude and minor adverse significance.
- 7.5.133 In addition, temporary stanks (water stops) would be installed within the trench prior to undertaking dewatering/draining activities, to prevent migration of water within the trench (G134).
- 7.5.134 In summary, the potential effect of dewatering on the Bourley and Long Valley SSSI is of small magnitude of minor adverse significance.

ii) Changes to groundwater quality from chemical or pollutant leaks and spills

- 7.5.135 In the unlikely event of chemical or pollutant leaks or spills during construction there is a risk to water quality of groundwater upon which GWDTE are dependent. This



could lead to potential effects to wet woodland and marshy grassland GWDTE habitats of Bourley and Long Valley SSSI resulting in their loss, fragmentation or modification.

7.5.136 Good practice measures would be implemented to reduce the risk of potential effects, secured through the DCO requirements such as the CoCP. Measures would comprise:

- appropriate storage and handling of fuels and other substances hazardous to the environment (G8);
- potentially hazardous materials used during construction would be safely and securely stored including use of secondary containment where appropriate (G119);
- 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 (G121);
- fuels, oils and chemicals would be stored responsibly, away from sensitive water receptors. They would be stored >15m from watercourses, ponds and GWDTE (G142); and
- 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 (G117).

7.5.137 In addition to the above measures, as construction within most of the Order Limits within the SSSI is likely to be in drier areas, in the unlikely event of a spillage there would be some attenuation of the released pollutant as it infiltrates the unsaturated zone. This would further limit the potential impact to groundwater sources supplying GWDTE.

7.5.138 Based on the above, the potential effects of changes to groundwater quality from chemical or pollutant leaks and spills on GWDTE of Bourley and Long Valley SSSI would be of negligible magnitude of negligible significance.

Hydrological Change – Surface Water Contamination

7.5.139 The notified invertebrate and bird assemblages dependent on freshwater sources could be impacted by a change in quality of that resource.

7.5.140 Proposed construction activities would be located within the surface water catchment of Bourley and Long Valley SSSI. Hydrological links between the project and the SSSI, via the unnamed watercourses WCX038 and WCX039 and Gelvert Stream (WCX040), have been identified.

7.5.141 Potential impacts to sensitive habitats or species of the SSSI could arise from the release of sediment or chemical pollutants into the Gelvert Stream and surface water drainage within the SSSI. This could cause destruction or damage of qualifying habitats and habitats supporting qualifying/interest features.



- 7.5.142 The risk of pollution events occurring during construction are considered to be extremely low due to the application of previously described good practice measures (e.g. G8, G11, G12, G39, G119, G121, G122 and G142) set out in the REAC. This is further reduced as these watercourses would be crossed with trenchless techniques.
- 7.5.143 Considering the embedded and good practice measures, the potential for surface water contamination impact on the Bourley and Long Valley SSSI is highly unlikely. As such, the potential impact is of negligible magnitude and negligible significance.

Air Quality Changes – Dust Deposition

- 7.5.144 Air quality changes could occur through fugitive dust caused by construction plant activities. Within 50m of the Order Limits (IAQM, 2014), terrestrial habitat receptors, particularly the notified NVC plant communities H2, M16, M21 and M25 within the Bourley and Long Valley SSSI may be affected through changes in air quality as the vegetation it supports may experience reduced photosynthesis, respiration and transpiration caused by smothering from dust.
- 7.5.145 A dust management plan would be produced, including the following measures to be implemented where relevant (G30):
- control runoff of water or mud to reduce the spread of particulates that could subsequently be disturbed and become airborne;
 - return subsoil and topsoil at the earliest suitable time of year after construction has been completed;
 - manage earthworks and soil by methods such as covering, seeding or using water suppression where appropriate;
 - limit de-compaction of the subsoil in windy conditions during reinstatement;
 - construct compound access points to the public highway with temporary hard surfacing;
 - enforce an appropriate speed limit for vehicles travelling on site to limit dust generation;
 - make an adequate water supply available for effective dust/particulate matter suppression/mitigation;
 - protect sand and other aggregates from drying out.
 - limit drop heights when loading and unloading materials from vehicles including pipes and excavated materials;
 - control the number of handling operations to ensure that dusty material is not moved or handled unnecessarily;
 - where there is a risk of dust nuisance when using cutting, grinding or sawing equipment, use in conjunction with suitable dust suppression techniques;
 - keep equipment readily available to clean any dry spillages;
 - clean up spillages as soon as reasonably practicable after the event using wet cleaning methods;



- limit dry sweeping of large areas;
- prohibit bonfires and the burning of waste materials;
- provide adequate wheel washing facilities at all logistics hubs and large compound access points on to the highway;
- deploy water assisted road cleaners on public roads when necessary to prevent excessive dust or mud deposits;
- sheet vehicle loads during the transportation of loose or potentially dusty material or contaminated excavation material; spoil; and
- undertake inspections to monitor dust and record results in the Environmental log. The frequency of inspections to be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

7.5.146 Appendix 13.2 Air Quality Technical Note shows that, taking into account the good practice measures set out in the REAC, there are no potentially significant effects in relation to air quality and there is no requirement for mitigation.

7.5.147 Based on this, the potential impact is of small magnitude and minor adverse significance.

Table 7.17: Summary of Potential Impacts on Biodiversity - Bourley and Long Valley SSSI

Potential Impact	Value	Magnitude	Significance
Bourley and Long Valley SSSI (also as component SSSI of Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC)			
Habitat loss/gain, fragmentation or modification			
i. notified habitat features and other habitats	High	Small	Minor
ii. notable plants	High	Small	Minor
Habitat supporting faunal interest features of the SSSI			
i. notified species - breeding birds	High	Small	Minor
ii. notified species - terrestrial invertebrates	High	Negligible	Minor
iii. notified species - adder	High	Small	Minor
Introduction/spread of INNS	High	Negligible	Negligible
Species mortality/injury			
i. notified species - breeding birds	High	Negligible	Negligible
ii. notified species – terrestrial invertebrates	High	Small	Minor
iii. notified species - adder	High	Negligible	Negligible
Species disturbance			
i. notified species – breeding birds	High	Negligible	Negligible
ii. notified species – adder	High	Small	Minor
Hydrological changes to groundwater dependent terrestrial ecosystems (GWDTE)			
i. Changes to groundwater levels or flows caused by temporary dewatering	High	Small	Minor
ii. Changes to groundwater quality from chemical or pollutant leaks or spills	High	Negligible	Negligible
Hydrological change – surface water contamination	High	Negligible	Negligible
Air quality changes – dust deposition	High	Small	Minor



Basingstoke Canal SSSI

- 7.5.148 Basingstoke Canal SSSI is designated for its variety of swamp and fen vegetation communities, standing water habitat, wet heath, vascular plant assemblage and invertebrate (particularly dragonfly) assemblage.
- 7.5.149 The Order Limits cross Unit 1 of the SSSI defined in the most recent condition report in 2010 as being of unfavourable-declining condition (Natural England, undated b) due to a decline in extent of vegetation types and species richness, potentially attributable to elevated levels of siltation.
- 7.5.150 The pipeline would cross the Basingstoke Canal via trenchless installation techniques (TC013). There would be no construction work activity within the SSSI. The closest above-ground works areas would be at the necessary drill pits, located over 50m away from the SSSI, separated from it by the A323 to the south and to the north by an area of woodland and Old Ively Road. Nevertheless, the potential impact pathways identified for Basingstoke Canal SSSI comprise the following and are each detailed, in turn:
- habitat loss/gain, fragmentation or modification;
 - hydrological change – surface water contamination; and
 - air quality changes – dust deposition.

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.151 Although the Order Limits cross the SSSI, the pipeline would be installed by trenchless methods underneath the Basingstoke Canal (TC013).
- 7.5.152 All works in this area would be subsurface resulting in avoidance of any watercourse or above ground habitat loss, fragmentation or modification.
- 7.5.153 As such, given the construction techniques and the set-back distances proposed, the Basingstoke Canal SSSI would not be affected and so the potential impact is of negligible magnitude and negligible significance.

Hydrological Change – Surface Water Contamination

- 7.5.154 Potential hydrological changes are detailed in Chapter 8 Water and include predicted change to surface water quality within affected watercourses.
- 7.5.155 Hydrological links between the project and the Basingstoke Canal SSSI, both directly and via the Gelvert Stream, have been identified. Potential impacts to notified sensitive swamp and fen habitats and dragonfly species of the SSSI could also arise from the release of sediment or chemical pollutants into these watercourses.
- 7.5.156 The Basingstoke Canal SSSI would be crossed using trenchless construction techniques (TC013). There would be no construction work activity within the SSSI. The closest above-ground works areas would be over 50m away from the SSSI. As such, there is considered to be a negligible likelihood of any potential direct installation work interaction with the SSSI. This likelihood is reduced further with the



implementation of good practice measures, set out in the REAC and secured through DCO requirements such as the CoCP (e.g. G12, G39, G119, G121, G122 and G142).

- 7.5.157 This potential impact resulting from contamination of the Gelvert Stream (WCX040) would be further reduced as it would be crossed using trenchless techniques with drill pits a minimum of 90m from the watercourse itself.
- 7.5.158 Considering the embedded and good practice measures proposed, any potential impact on the Basingstoke Canal SSSI resulting from surface water contamination is highly unlikely. As such, there would be a negligible magnitude of change and negligible significance.

Air Quality Changes – Dust Deposition

- 7.5.159 Air quality changes could potentially occur through fugitive dust caused by construction plant activities. Within 50m of the Order Limits (IAQM, 2014), retained terrestrial and freshwater habitat receptors within the Basingstoke Canal SSSI may be affected through changes in air quality as the plant communities it supports may experience reduced photosynthesis, respiration and transpiration caused by smothering from dust.
- 7.5.160 The trenchless construction techniques proposed to cross the Basingstoke Canal SSSI (TC013) would involve excavation of drive pits at distances further than 50m from the SSSI boundary. As such, the SSSI is located outside the zone of influence for dust deposition.
- 7.5.161 During construction a dust management plan would be produced (G30), as previously described. The adoption of good practice measures within the plan would manage the generation of emissions at source and limit their spread.
- 7.5.162 Appendix 13.2 Air Quality Technical Note shows that, taking into account the good practice measures, there are no potentially significant effects in relation to air quality and there is no requirement for mitigation. Based on this, the potential impact of dust deposition is of small magnitude and minor adverse significance.

Table 7.18: Summary of Potential Impacts on Biodiversity - Basingstoke Canal SSSI

Potential Impact	Value	Magnitude	Significance
Basingstoke Canal SSSI			
Habitat loss/gain, fragmentation or modification	High	Negligible	Negligible
Hydrological change – surface water contamination	High	Negligible	Negligible
Air quality changes – dust deposition	High	Small	Minor

Eelmoor Marsh SSSI

- 7.5.163 Eelmoor Marsh SSSI is designated for its heath, mire and acid grassland vegetation communities and its invertebrate assemblage, particularly the silver-studded blue butterfly.
- 7.5.164 The Order Limits do not intersect Eelmoor Marsh SSSI but do pass immediately adjacent to it for approximately 300m in the Old Ively Road between Ordnance



Survey grid reference SU 83316 53626 and SU 83624 53818. The Order Limits border Unit 1 of the SSSI at this location mainly comprises dry heath and is in favourable condition, as of 2014 (Natural England, undated c).

- 7.5.165 The potential impact pathways identified for Eelmoor Marsh SSSI comprise the following and are each detailed, in turn:
- introduction/spread of INNS;
 - hydrological changes to groundwater dependent terrestrial ecosystems; and
 - air quality changes – dust deposition.

Introduction/Spread of INNS

- 7.5.166 No survey work to identify INNS has been undertaken within Eelmoor Marsh SSSI but desk study has identified Druce's crane's-bill, garden creeper, hairy bamboo, lodgepole pine, New Zealand pigmyweed, rhododendron, and Virginia creeper within Eelmoor Marsh SSSI (Appendix 7.4 Invasive Non-Native Plant Species Factual Report). Any further introduction or spread of existing INNS, or other species with origins outside of the Order Limits could potentially cause significant adverse effects to sensitive habitats in Eelmoor Marsh SSSI due to the dominance that INNS can have over native species.
- 7.5.167 There would be no construction activities within the SSSI and so there is very low potential for INNS to be introduced or spread via contaminated machinery or soil. However, there is a theoretical impact pathway via contaminated surface water run-off entering the SSSI from the adjacent Order Limits and pre-construction surveys would be completed if existing baseline survey data need to be updated or supplemented (G33).
- 7.5.168 A suitable methodology would be produced to set out how identifiable areas with the potential presence of Schedule 9 plant species or other invasive species would be demarcated, and how any affected soils would be appropriately managed throughout the works (G42). Good practice measures would also be implemented to reduce the risk of contaminating watercourses, such as those set out in G12, G39 and G119.
- 7.5.169 Given the above good practice measures, the potential magnitude of change due to the introduction/spread of INNS is of negligible magnitude and negligible significance.

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

- 7.5.170 Eelmoor Marsh SSSI is outside of the Order Limits and no habitat survey of the site was undertaken. Information about habitats within the site and their potential groundwater dependence has been collated from publicly available sources and background environmental information obtained from HBIC, as described in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment.
- 7.5.171 The notified features of Eelmoor Marsh SSSI comprise dry dwarf shrub heath and acid grassland which are not groundwater dependent. The SSSI also supports the NVC plant community M25 *Molinia caerulea-Potentilla erecta mire*, which can be



groundwater dependent. The SSSI citation describes the site as supporting rich acid wetland habitats and there are numerous springs and seepages mapped within the site (Figure A8.3.19 in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment) indicating that the site potentially supports wetland habitats that are groundwater dependent.

7.5.172 The area of the Order Limits along the northern boundary of Eelmoor Marsh SSSI was surveyed and did not support groundwater dependent habitats. Based on topography and the available hydrogeological information, any groundwater dependent habitats within the SSSI are likely to be some distance to the south of Order Limits, down gradient of the Order Limits. The Order Limits along the SSSI boundary and the area of the SSSI immediately to the south of the Order Limits comprise a deep unsaturated zone.

i) Changes to groundwater levels or flows caused by temporary dewatering

7.5.173 During installation of the pipeline, the open cut trench is expected to be located above the water table along the northern boundary of Eelmoor Marsh SSSI. Therefore, dewatering would not be likely be required and there would be no potential for effects to GWDTE within Eelmoor Marsh SSSI via this pathway.

ii) Changes to groundwater quality from chemical or pollutant leaks and spills

7.5.174 In the unlikely event of chemical or pollutant leaks or spills during construction there is a risk to groundwater quality of upon which GWDTE are dependent. This could lead to potential effects to marshy grassland GWDTE habitats of Eelmoor Marsh SSSI resulting in their loss, fragmentation or modification.

7.5.175 Good practice measures would be implemented to reduce the risk of potential pollution effects. Measures would include:

- appropriate storage and handling of fuels and other substances hazardous to the environment (G8);
- potentially hazardous materials used during construction would be safely and securely stored including use of secondary containment where appropriate (G119);
- 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 (G121);
- fuels, oils and chemicals would be stored responsibly, away from sensitive water receptors. They would be stored >15m from watercourses, ponds and GWDTE (G142); and
- 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 (G117).



- 7.5.176 In addition to the above measures, as installation within most of the Order Limits would be in drier, unsaturated areas, in the unlikely event of a spillage there would be some attenuation of the released pollutant as it infiltrates the unsaturated zone. This would further limit the potential impact to groundwater sources supplying GWDTE.
- 7.5.177 Based on the above, the potential effects of changes to groundwater quality from chemical or pollutant leaks and spills on the GWDTE of Eelmoor Marsh SSSI would be of negligible magnitude and negligible significance.

Air Quality Changes – Dust Deposition

- 7.5.178 Air quality changes could occur through fugitive dust caused by construction plant activities. Within 50m of the Order Limits (IAQM, 2014), retained terrestrial habitat receptors within the Eelmoor Marsh SSSI may be affected through changes in air quality as the plant communities it supports may experience reduced photosynthesis, respiration and transpiration caused by smothering from dust.
- 7.5.179 During construction all works would be in accordance with a dust management plan (G30).
- 7.5.180 Appendix 13.2 Air Quality Technical Note shows that, taking into account this and other good practice measures set out in the REAC, there are no potentially significant effects in relation to air quality and there is no requirement for mitigation.
- 7.5.181 Based on this, the potential impact is of small magnitude and minor adverse significance.

Table 7.19: Summary of Potential Impacts on Biodiversity - Eelmoor Marsh SSSI

Potential Impact	Value	Magnitude	Significance
Eelmoor Marsh SSSI			
Introduction/spread of INNS	High	Negligible	Negligible
Hydrological changes to groundwater dependent terrestrial ecosystems			
i. Changes to groundwater levels or flows caused by temporary dewatering	High	Potential Impact Avoided	
ii. Changes to groundwater quality from chemical or pollutant leaks or spills	High	Negligible	Negligible
GWDTE – Changes to groundwater quality from chemical or pollutant leaks or spills	High	Negligible	Negligible
Air quality changes – dust deposition	High	Small	Minor

Colony Bog and Bagshot Heath SSSI

- 7.5.182 The Order Limits cross Colony Bog and Bagshot Heath SSSI between Ordnance Survey grid references SU 90941 58809, SU 90896 60650 and SU 93765 61655. The total length of the route within the SSSI is approximately 4km. The Order Limits encompass a total area of the SSSI of approximately 14.50ha. The area of the SSSI is 1,130ha.



- 7.5.183 Preliminary construction drawings illustrating the proposed construction works within the SSSI are provided on figure 7.6, Figure 7.7, Figure 7.10 and Figure 7.11. There would be reduced-width working at all locations, with the working width being between 10m and 20m wide to reduce impacts to vegetation and soils.
- 7.5.184 Pipeline installation at all locations within the SSSI would use open cut.
- 7.5.185 The SSSI units within the Order Limits within Colony Bog and Bagshot Heath SSSI are: Unit 9 – Chobham Ridges, Unit 4 – Folly bog and Unit 5 – Turf Hill. Detailed habitat descriptions and botanical survey results are provided in Appendix 7.1 Habitats and Botany Factual Report. A summary is provided in the following paragraphs.
- 7.5.186 The Order Limits enter the SSSI at the western boundary of the site, within Unit 9 of the SSSI. The route initially heads north, just inside the western perimeter of the SSSI. No Annex I habitat was identified in this unit within the survey area. The area comprised a long narrow strip of mostly wooded habitat, with small areas of acid and neutral grasslands. The grassland habitats were maintained by mowing of MoD access routes and were very disturbed.
- 7.5.187 The Order Limits follow the MoD access track north, turning east inside the northern perimeter within Unit 4 of the SSSI. Where the unit widens, the higher ground supports a large tract of dry heathland, stands of dense bracken and scrub, and small areas of acid grassland.
- 7.5.188 Folly Bog occupies the low ground in the eastern half of Unit 4 and is a large area of predominantly valley mire with peripheral wet and dry dwarf shrub heath.
- 7.5.189 A narrow strip (no more than 5m wide) of wet heath 'Northern Atlantic wet heaths with *Erica tetralix* is present within the Order Limits along the northern edge of Folly Bog for approximately 75m. Although within the Order Limits, this habitat falls outside the Limits of Deviation and so would not be affected by trench excavation. The Order Limits avoid Folly Bog, adopting an alignment entirely within the existing track or through dry heathland and woodland, in accordance with the drawings provided on figure 7.6, Figure 7.7, Figure 7.10 and Figure 7.11.
- 7.5.190 The Order Limits through the Turf Hill unit of the SSSI (Unit 5) have been designed to avoid impacts to heathland and associated fauna (Figure 7.11). No direct interaction with Annex I habitat is anticipated for the Order Limits through Unit 5.
- 7.5.191 Habitat within the Order Limits in Unit 5 comprises conifer plantation of Scots pine (*Pinus sylvestris*). As the route exits the SSSI, it avoids a small area of wet heath 'Northern Atlantic wet heaths with *Erica tetralix* SAC qualifying habitat present at the eastern end of the unit (Figure A7.1.96 in Appendix 7.1 Habitats and Botany Factual Report). The required construction compound necessary for the trenchless pipeline crossing under Lightwater Bypass (A322) has been positioned to align with a small stand of pine trees, thus avoiding heathland habitat. Tree clearance here would facilitate post-construction heathland regeneration.
- 7.5.192 Good practice measures seek to avoid or reduce impacts to soils, vegetation and notable species through the following provisions:



- narrow working techniques adjacent to Maultway to reduce impacts on mature screening trees. Also the working width reduced to 15m adjacent to the existing track to reduce impacts to Colony Bog and Bagshot Heath SSSI and potential bat roost features. The approximate distance would be 3.8km (Grid ref: SU90976 58802 to SU92520 61386 (NW21));
- working width reduced to 15m to reduce impacts to woodland at Turf Hill over an approximate distance of 888m (Grid ref: SU9305 161494 to SU93775 61660) (NW22);
- where works in wet heath would be unavoidable, effects on soils and surface vegetation would be reduced through the use of ground protection matting and appropriate machinery where practicable (G51);
- topsoil stripping would be reduced to a minimum extent within European sites and SSSIs except where identified within the HRA (some unavoidable stripping would take place as part of the trenching for the pipeline and in construction compounds where matting is not a workable alternative) (HRA4);
- where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40);
- at heathland SSSIs, targeted scrub and secondary woodland within the Order Limits would be removed. Subject to landowner consent, these areas would be reinstated as heathland or acid grassland through natural regeneration (HRA2);
- heathland within statutory or non-statutory designated wildlife sites would be reinstated using natural regeneration, unless otherwise agreed with Natural England (HRA1); and
- earth banks within SSSIs which are likely to be of importance for common reptiles and invertebrates should be avoided and protected, where practicable. If their removal is unavoidable during construction, the banks should be reinstated (G57).

7.5.193 The potential impact pathways identified for Colony Bog and Bagshot Heath SSSI comprise the following and are each detailed, in turn:

- habitat loss/gain, fragmentation or modification;
- introduction/spread of INNS;
- species mortality/injury;
- species disturbance;
- hydrological changes to groundwater dependent terrestrial ecosystems; and
- air quality changes – dust deposition.

Habitat Loss/Gain, Fragmentation or Modification

i) Notified habitat interest features of the SSSI and other habitats

- 7.5.194 At Colony Bog and Bagshot Heath SSSI, the Order Limits have been designed to largely follow an existing track, reducing the construction impact to habitats within the SSSI. The Order Limits comprise approximately 15.24ha within the SSSI. Although the Order Limits have been designed to avoid the highly sensitive Folly Bog and any potential impacts to heathland habitat at Turf Hill, areas of Priority Habitat and Annex I habitats within the Order Limits in the Colony Bog and Bagshot Heath SSSI remain:
- Lowland Dry Acid Grassland;
 - Lowland Heathland;
 - Lowland Mixed Deciduous Woodland;
 - Purple Moor-grass and Rush Pastures; and
 - Wet Woodland.
 - Annex I habitats:
 - H4010 Northern Atlantic wet heaths with *Erica tetralix*;
 - H4030 European dry heaths; and
 - H9190 Old acidophilous oak woods with *Quercus robur* on sandy plains.
- 7.5.195 Detailed plans showing the location and extent of these habitats are provided on figure A7.1.148 to A7.1.150 in Appendix 7.1 Habitats and Botany Factual Report.
- 7.5.196 The project would affect SSSI habitat within the Order Limits through excavations and clearance of vegetation. Vegetation clearance would be required in advance of construction works (where these areas were vegetated) to facilitate the movement of construction plant and to displace wildlife from the working area (e.g. reptiles).
- 7.5.197 To reduce vegetation loss and to protect soils, topsoil stripping would be reduced (HRA4) and the existing access tracks would be utilised as haul routes where practicable. In addition, narrow width working would be implemented through Colony Bog and Bagshot Heath SSSI (NW21 and NW22, see Figure 7.5). This would reduce the area of habitats impacted within the Order Limits from 15.24ha to approximately 7.73ha. The specific habitats affected would comprise approximately:
- 0.61ha of semi-natural broad-leaved woodland;
 - 0.91ha unimproved acid grassland;
 - 0.16ha unimproved neutral grassland;
 - 0.47ha dry acid dwarf shrub heath; and
 - 4.57ha of common and widespread, non-Priority Habitats, e.g. improved grassland and plantation woodlands.
- 7.5.198 Approximately 1.01ha within the Order Limits at Colony Bog and Bagshot Heath SSSI would be set aside for possible habitat mitigation works, as required (e.g.



HRA2, G53). This area would be unaffected by construction works. This is discussed further below.

- 7.5.199 The Order Limits have been designed to reduce the area of wet heath habitats potentially affected by physical disturbance. The Order Limits include a total area of approximately 0.04ha of wet heath (the Annex I habitat 'Northern Atlantic wet heaths with *Erica tetralix*'). There are no areas of the Annex I habitat 'Depressions on peat substrates of the *Rhynchosporion*' within the Order Limits. Wet heath habitat in the Order Limits within the SSSI would not be affected by excavations, as the Limits of Deviation (i.e. the area within which the pipeline would be positioned) do not encompass any of this habitat. Sensitive habitat outside the Limits of Deviation but within the Order Limits would be protected from damage by ancillary activities (e.g. plant movements) by a commitment that provides that where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).
- 7.5.200 Topsoils and subsoils intended for reinstatement would be temporarily stockpiled as close to where they were stripped from as practicable (G155) and different soil types and made ground would be stripped and stored separately where applicable (G159). A methodology would be produced for stripping, handling, storage and replacement of all soils to reduce risks associated with soil degradation. This would include (G151):
- identification of appropriate plant to strip, reinstate and otherwise handle soils;
 - methods for compaction and grading of stockpiles;
 - methods for working in naturally wet soils; and
 - specification of appropriate decompaction measures to be used during reinstatement.
- 7.5.201 As a result of the embedded and good practice measures described, there would be no permanent (irreversible) direct loss of habitat as any land-take as part of construction would be temporary. Following substrate reinstatement, heathland would be reinstated using natural regeneration, unless otherwise agreed with Natural England (HRA1). Soil disturbance and natural regeneration is consistent with standard conservation measures for the restoration and management of heathland, and there is a high degree of confidence that disturbed habitats could be reinstated to pioneer heathland or acid grassland in the short to medium term by these methods (Gimingham, 1992).
- 7.5.202 As a proportion of the entire designated site (6.72ha equating to approximately 0.05% of the overall SSSI), the area of temporary habitat loss is extremely small and avoids the most sensitive wetland and wet woodland habitats.
- 7.5.203 Taking account of the embedded and good practice detailed above, the potential impact is of small magnitude and minor adverse significance.

- 7.5.204 This is consistent with the project's HRA Report (**application document 6.5**) which concluded the following for Thursley, Ash, Pirbright and Chobham SAC (of which Colony Bog and Bagshot Heath SSSI is a component):

'The relatively small area of loss with respect to the 'European dry heaths' feature was not likely to be significant within the context of the wider SAC'.

"Detailed botanical and vegetation survey and a hydrogeological study of the SAC were undertaken by the applicant in 2018 to support the Stage 2 study. The findings of this work demonstrated that the pipeline route selected would avoid adverse effects to the integrity of the SAC. In particular, the route selection was such that direct and indirect interaction with Annex I wetland qualifying habitats would be avoided entirely or reduced to the 'trivial level' permissible in the Conservation Objectives.'

i) Notable plants

- 7.5.205 Temporary habitat loss within the Colony Bog and Bagshot Heath SSSI would lead to the direct loss of individuals of the notable plant species dodder and bog myrtle. Although notable, these species were not exclusively recorded within the Order Limits (see Appendix 7.1 Habitats and Botany Factual Report). Dodder, although rare in Unit 4, was also occasional in Unit 5 - Turf Hill. Bog myrtle was rare in Brentmoor Heath but locally abundant in Unit 4 - Folly Bog. It can be reasonably assumed that the proportion of the populations of bog myrtle potentially lost would not be significant compared to populations across the SSSI as a whole. Dodder is an annual seed-bearing parasitic plant suggesting few limitations to re-establishment after reinstatement.
- 7.5.206 Considering the widespread distribution over the SSSI, reduced working width and other good practice measures outlined above, the potential impact of temporary habitat loss on notable plant species within Colony Bog and Bagshot Heath SSSI is of negligible magnitude and minor adverse significance.

Habitat Supporting Faunal Interest Features of the SSSI

- 7.5.207 Temporary loss of habitat within the Colony Bog and Bagshot Heath SSSI has the potential to affect species of fauna that are interest features of the SSSI and qualifying features of the Thames Basin Heaths SPA, of which the SSSI is a component: breeding birds (Dartford warbler, nightjar and woodlark); and heathland specialist terrestrial invertebrates.

i) Breeding birds

- 7.5.208 The SSSI's citation lists the following heathland bird species as breeding on the site: Dartford warbler, nightjar, woodlark, hobby, stonechat, tree and meadow pipits, yellowhammer and reed bunting.
- 7.5.209 Breeding territories of Dartford warbler have been recorded consistently within, and adjacent to, the Order Limits throughout the SSSI. There were no records of nightjar and woodlark in the last five years. In 2008, one woodlark territory was identified approximately 90m from the Order Limits (2Js Ecology, 2008-18).



- 7.5.210 Desk study information indicate that Dartford warbler, nightjar or woodlark do not rely on habitat within Unit 9 during the breeding season (2Js Ecology, 2008-18).
- 7.5.211 Habitat within Unit 4 is suitable for nightjar (Natural England, 2016), but no breeding territories have been reported since 2002. The stands of dense gorse are known to support Dartford warbler (Natural England, 2014). Desk study information show a fluctuating presence of Dartford Warbler territories within this tract of dry heathland since 2012, with a peak of seven territories in 2015, but only one in 2017. Seven territories were identified in 2018 (2Js Ecology, 2008-18). Three woodlark territories have been observed since 2008, but not since 2015.
- 7.5.212 Although desk study information indicate that Dartford warbler and nightjar are routinely present during the breeding season in Unit 5 (Turf Hill), the habitats within the Order Limits comprise conifer plantation and so are unsuitable for these species. Woodlark have not been recorded in the last two years but were recorded previously (2Js Ecology, 2008-18).
- 7.5.213 Clearance of dry heathland and gorse vegetation within the Order Limits would lead to a loss of available habitat for feeding, shelter and nesting Dartford warbler, nightjar or woodlark.
- 7.5.214 As described above, the area of habitat that would be temporarily lost as a result of construction is small compared to the total area of the SSSI and Thames Basin Heaths SPA (1.3% and 0.2%, respectively) and would be further reduced by embedded and good practice measures. All loss of heathland habitat suitable for these bird species would be temporary, being restored by natural regeneration following construction (HRA1). The affected habitats are anticipated to re-establish to young heathland within the short term.
- 7.5.215 During the period of regeneration, there would be a large alternative resource of suitable breeding habitat available for bird interest features within the adjacent heathland. This is supported by a desk study of breeding territories of Dartford warbler, nightjar and woodlark (HRA Report (**application document 6.5**) and Appendix 7.8 Bird Factual Report) which shows that these bird species breed in habitats widely distributed across the SSSI, indicating that there is suitable alternative breeding habitat available.
- 7.5.216 Other bird species listed in the SSSI citation prefer heathland and conifer plantation habitats but are widespread and commonly found outside of designated sites and in a variety of other habitat types. This would suggest that these species are not reliant on the habitats of the Colony Bog and Bagshot Heath SSSI within the Order Limits.
- 7.5.217 Given the localised and temporary scale of habitat loss resulting from the project, any potential effects to the breeding bird interest features of Colony Bog and Bagshot Heath SSSI via temporary habitat loss are of small magnitude and minor adverse significance.
- ii) *Terrestrial invertebrates (heathland specialists)*
- 7.5.218 The Colony Bog and Bagshot Heath SSSI citation does not list any specific invertebrate species as notified features of the site but does refer to the wider



invertebrate assemblage. Therefore, it has been assumed that any heathland habitat within the Order Limits could be used by heathland invertebrate species that contribute towards this general assemblage.

- 7.5.219 The area of heathland habitats within the Order Limits affected by vegetation clearance would be small compared to that within the SSSI as a whole. In the context of this much larger resource, the loss of suitable habitat within the Order Limits is therefore unlikely to adversely affect the invertebrate interest of the SSSI. Moreover, as described above, the loss of habitat within the Order Limits would be temporary.
- 7.5.220 Earth banks within SSSIs which are likely to be of importance for invertebrates would be avoided and protected, where practicable. If their removal is unavoidable during construction, the banks would be reinstated (G57).
- 7.5.221 Targeted scrub and secondary woodland within the Order Limits would be removed. Subject to landowner consent, these areas would be reinstated as heathland or acid grassland through natural regeneration (HRA2). This would represent a habitat improvement within the Order Limits for invertebrates.
- 7.5.222 Given the small and temporary loss of suitable habitat, the potential impact to the invertebrate feature of the SSSI is of negligible magnitude and minor adverse significance.

Introduction/Spread of INNS

- 7.5.223 At Colony Bog and Bagshot Heath SSSI, the following INNS were recorded within the Order Limits during 2018 field surveys: Shallon (*Gaultheria shallon*), *Rhododendron*, montbretia, wall cotoneaster (*Cotoneaster horizontalis*), variegated yellow archangel (*Lamiastrum galeobdolon* subsp. *Argentatum*), butterfly bush (*Buddleja davidii*), juneberry (*Amelanchier lamarckii*), Franchet's cotoneaster (*Cotoneaster franchetii*), steeple-bush (*Spiraea douglasii*), willow-leaved cotoneaster (*Cotoneaster salicifolius*), cherry laurel (*Prunus laurocerasus*) and snowberry (*Symphoricarpos albus*). Goat's-rue (*Galega officinalis*) was recorded in the wider SSSI (Appendix 7.1 Habitats and Botany Factual Report and Appendix 7.4 Invasive Non-Native Plant Species Factual Report).
- 7.5.224 Any further introduction or spread of INNS, or other species with origins outside of the Order Limits, could potentially cause significant adverse effects to sensitive habitats in statutory designated sites due to the dominance that INNS can have over native species. Areas of potential risk from INNS within the Order Limits are detailed in Appendix 7.4 Invasive Non-Native Plant Species Factual Report.
- 7.5.225 During installation, there is potential for INNS to be introduced or spread via contaminated machinery or soil. There is also a risk of transferral from pedestrian movement and worker vehicles.
- 7.5.226 A suitable methodology would be produced to set out how identifiable areas with the potential presence of Schedule 9 plant species or other invasive species would be demarcated, and how any affected soils would be appropriately managed throughout the works (G42).



- 7.5.227 The risk of spreading INNS would be further reduced through previously described measures that would reduce ground disturbance and vegetation removal e.g. reduction in topsoil stripping (HRA4).
- 7.5.228 Given the above embedded design and good practice measures, the potential impact of introduction/spread of INNS is of negligible magnitude and negligible significance.

Species Injury/Mortality

- 7.5.229 The process of vegetation removal within Colony Bog and Bagshot Heath SSSI has the potential to kill or injure species of fauna that are interest features of the SSSI and qualifying features of the Thames Basin Heaths SPA, of which the SSSI is a component: breeding birds (Dartford warbler, nightjar and woodlark as qualifying features of the Thames Basin Heaths SPA) and hobby, stonechat, tree and meadow pipits, yellowhammer and reed bunting; and heathland specialist terrestrial invertebrates.

i) Breeding birds

- 7.5.230 It is embedded into the project's construction programme that potentially disturbing construction works within the Thames Basin Heaths SPA would be undertaken between 1 October and 31 January unless otherwise agreed with Natural England (G38). This would avoid the period during which the qualifying species would be breeding and so there would be negligible risk of killing chicks or destroying eggs.
- 7.5.231 Minor works in potential breeding habitats but that would not result in disturbance to birds may be undertaken outside this period subject to approval from Natural England e.g. pre-construction surveys, maintenance mowing of cleared vegetation to deter reptiles, dismantling of reptile hibernacula.
- 7.5.232 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 (G35).
- 7.5.233 As such, there is no potential impact pathway for injury/mortality to occur to breeding birds associated with Colony Bog and Bagshot Heath SSSI or the Thames Basin Heaths SPA. The potential impact is therefore of negligible magnitude and negligible significance.

ii) Terrestrial invertebrates (heathland specialists)

- 7.5.234 Many invertebrates, including spiders, dragonflies, butterflies, bees, wasps and ants, and true flies, would be dormant during the period when construction would take place within the SSSI, between 1 October and 31 January.



- 7.5.235 Any invertebrates present within affected vegetation, regardless of their life stage, could be injured or killed during vegetation clearance or excavation. However, earth banks within SSSIs which are likely to be of importance for invertebrates would be avoided and protected, where practicable. If their removal is unavoidable during construction, the banks would be reinstated (G57). In addition and as previously described, topsoil stripping would be reduced to a minimum extent within European sites and SSSIs (HRA4) thus reducing the extent of potential impact.
- 7.5.236 Given the small extent of heathland habitat that would be affected by vegetation clearance (approximately 0.47ha) out of an overall SSSI area of 1,130ha, the number of individuals potentially injured or killed by construction works is unlikely to significantly affect the favourable conservation status of the species or assemblages present.
- 7.5.237 As such, the magnitude of potential effects to the invertebrate feature of the SSSI resulting from mortality or injury is negligible and of minor adverse significance.

Species Disturbance

- 7.5.238 Changes to noise, vibration, visual and light stimuli during the construction works within Colony Bog and Bagshot Heath SSSI (and Thames Basin Heaths SPA of which the SSSI is a component site) has the potential to disturb species of fauna that are interest features of the SSSI and qualifying features of the Thames Basin Heaths SPA, of which the SSSI is a component: breeding birds (Dartford warbler, nightjar and woodlark as qualifying features of the Thames Basin Heaths SPA, and hobby, stonechat, tree and meadow pipits, yellowhammer and reed bunting).

i) Breeding birds

- 7.5.239 A detailed assessment with respect to disturbance to the qualifying features of the Thames Basin Heaths SPA is provided in the project's HRA Report. The assessment can be reasonably extrapolated to other breeding bird species present within the site.
- 7.5.240 It is embedded into the project's design that potentially disturbing construction works within the Thames Basin Heaths SPA would be undertaken between 1 October and 31 January unless otherwise agreed with Natural England (G38).
- 7.5.241 Minor and short-duration works in potential breeding habitats but that would not result in disturbance to breeding birds may be undertaken outside this period subject to approval from Natural England e.g. pre-construction surveys, maintenance mowing of cleared vegetation to deter reptiles, dismantling of reptile hibernacula.
- 7.5.242 Construction works within Colony Bog and Bagshot Heath SSSI would not be subject to seasonal constraints where these would take place within habitats that are unsuitable for breeding woodlark, nightjar and Dartford warbler e.g. dense conifer plantation at Turf Hill. Although such habitat might be used by hobby, there is a good practice measure that vegetation with the potential to support bird nests would not to 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 Environmental Clerk of Works (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 (G35).

7.5.243 As such, the potential impact pathway for significant disturbance to occur on breeding birds of the Thames Basin Heaths SPA and component Colony Bog and Bagshot Heath SSSI is of negligible magnitude and negligible significance.

7.5.244 This is consistent with the HRA Report (**application document 6.5**) which concluded:

'...that on the application of this mitigation, and other relevant good practice measures during construction, no impacts are predicted that could result in an adverse effect on the structure or ecological functioning of the site or the Conservation Objectives that define the favourable status of the qualifying features. The ecological function of supporting habitats within the SPA, such as those used for nesting, breeding or roosting, or the availability of prey species, would be maintained.'

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

7.5.245 Habitats that are dependent on groundwater levels, flows or quality have been identified within Colony Bog and Bagshot Heath SSSI, as described in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment. The dependency of habitats on groundwater has been assessed as ranging from high to low (Figures A8.3.25 and A8.3.28 in Appendix 8.3).

7.5.246 Habitats assessed as having a high groundwater dependency are located within Folly Bog, a valley mire within a topographic low within Unit 4 of the SSSI, shown on figure A8.3.28 (Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment), and in areas of valley mire to the south of the MoD perimeter fence. The latter area largely comprises Unit 10 of the SSSI and was not surveyed for the project. Due to the lack of available habitat information, shown on figure A8.3.25 (Appendix 8.3), the whole of Unit 10 is considered as a single GWDTE of high groundwater dependency. Folly Bog and Unit 10 are likely supported by separate hydrogeological catchments. Both areas are outside of the Order Limits.

7.5.247 Habitats assessed as having less dependence on groundwater within the SSSI comprise wet dwarf shrub heath. This is located on the periphery of Folly Bog, and in topographic lows within Units 5 and 6 (Brentmoor Heath and Turf Hill, respectively). The Order Limits include only a very small area of this habitat, on the eastern boundary of Unit 5 (Figure A8.3.25 in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment).

7.5.248 The remainder of Colony Bog and Bagshot Heath SSSI comprises acid grassland, dry dwarf shrub heath, broadleaved semi-natural woodland and coniferous plantation woodland. These habitats are not groundwater dependent.



i) Changes to groundwater levels or flows caused by temporary dewatering

- 7.5.249 In areas where installation would be by open cut and the depth of the trench would intersect the water table, dewatering would be required for the duration of installation at that location. Dewatering could temporarily lower groundwater levels and change groundwater flows on which GWDTE are dependent, leading to potential effects to GWDTE habitats resulting in their loss, fragmentation or modification. Water table depth would depend on the season during which pipeline installation take place. As potentially disturbing construction works are constrained to take place between 1 October and January 31 to avoid impacts to the Thames Basin Heaths SPA (G38), installation would take place within Colony Bog and Bagshot Heath SSSI during a seasonally wetter period such that dewatering would likely be required.
- 7.5.250 The contractor(s) would ensure that the time the trench is open in the vicinity of certain features, would only be as long as necessary for the installation of the pipeline. The required dewatering of the trench would be undertaken only as and when necessary to enable safe working and preparation for pipe installation (G132).
- 7.5.251 The Order Limits within the west and northwest of the Colony Bog and Bagshot Heath SSSI are within the hydrogeological catchment of Unit 10 of the SSSI. However, the Order Limits are in topographically elevated areas with a deep unsaturated zone. Therefore, dewatering would not likely be required and there would be no potential effect.
- 7.5.252 Within the hydrogeological catchment of Folly Bog, the Order Limits are also largely elevated above the likely groundwater level. However, to the northeast of Folly Bog the Order Limits are at an elevation approximately within 1m of that of Folly Bog and there is the potential for the pipeline trench to intersect the level of groundwater supplying Folly Bog to the south. Therefore, temporary dewatering at this location may be required and there is potential for effects on GWDTE to result. The groundwater dependent habitats within Folly Bog relative to this location comprise wet dwarf shrub heath immediately to the south, valley mire further to the southwest, and more extensive valley mire to the south, separated from the Order Limits by the watercourse draining Folly Bog (Figure A8.3.28 in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment). This watercourse is a deep artificial watercourse, and likely separates Folly Bog into areas supplied by groundwater flow from the north (from the direction of the Order Limits), and areas supplied by flow from the south, including the main area of valley mire. The wet dwarf shrub heath to the south of the Order Limits is degraded, likely through a combination of artificial drainage by the watercourse and lack of management (see Appendix 7.1 Habitats and Botany Factual Report). Both wet dwarf shrub heath and valley mire habitats support plant communities that are notified features of the SSSI.
- 7.5.253 The potential effect on these GWDTE of the SSSI would be temporary, lasting for the duration of construction. Moreover, based on the assessment of the hydrogeological function of Folly Bog described above, the effect would be evident locally only, to the north of the main watercourse and within wet dwarf shrub heath which has a groundwater dependence of low to moderate, i.e. is less dependent on groundwater levels than valley mire to the south and southwest. As pipeline installation would be seasonally constrained, dewatering would take place when vegetation is dormant, and the response to a temporarily lowered water table would



not be expected to be comparable to that during the growing period. Therefore, the impact would unlikely to lead to change in the vegetation such that it would no longer form part of the wet dwarf shrub heath feature of the SSSI. In conclusion, based on the small area potentially affected and transient nature of the potential effect, the potential effect due to dewatering during construction is of negligible magnitude and negligible significance.

- 7.5.254 The Order Limits within Unit 6 are largely on the higher ground within coniferous plantation woodland, to the west and north of two areas of groundwater dependent wet dwarf shrub heath (Figure A8.3.25 in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment). Groundwater appears to be shallower in this area, so that it is possible that if the trench were excavated near to areas of wet dwarf shrub heath at times of higher groundwater levels, dewatering could be required. Where the Order Limits are along the northern boundary of the SSSI, one of these wet dwarf shrub heath GWDTE would be down gradient. This GWDTE is assessed as having moderate to high groundwater dependence. The second wet dwarf shrub heath GWDTE receptor is up gradient of the Order Limits; such that dewatering would not intercept groundwater supplying it.
- 7.5.255 In addition, temporary stanks would be installed within the trench prior to undertaking dewatering/draining activities, to prevent migration of water within the trench (G134).
- 7.5.256 The potential dewatering effects on Colony Bog and Bagshot Heath SSSI is of negligible magnitude and minor adverse significance.

ii) Changes to groundwater quality from chemical or pollutant leaks and spills

- 7.5.257 In the unlikely event of chemical or pollutant leaks or spills during construction there is a risk to groundwater quality of upon which GWDTE are dependent. This could lead to potential effects to wet dwarf shrub heath GWDTE habitats of Colony Bog and Bagshot Heath SSSI resulting in their loss, fragmentation or modification.
- 7.5.258 Good practice measures set out in the REAC and secured through DCO requirements such as the CoCP would be implemented to reduce the risk of pollution. Measures would include:
- appropriate storage and handling of fuels and other substances hazardous to the environment (G8);
 - potentially hazardous materials used during construction would be safely and securely stored including use of secondary containment where appropriate (G119);
 - 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 (G121);
 - fuels, oils and chemicals would be stored responsibly, away from sensitive water receptors. They would be stored >15m from watercourses, ponds and GWDTE (G142); and



- 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 (G117).

7.5.259 In addition to the above measures, as construction within most of the Order Limits would be in drier, unsaturated areas, in the unlikely event of a spillage there would be some attenuation of the released pollutant as it infiltrates the unsaturated zone. This would further limit the potential impact to groundwater sources supplying GWDTE.

7.5.260 Based on the above, the potential effects of changes to groundwater quality from chemical or pollutant leaks and spills on the GWDTE of Colony Bog and Bagshot Heath SSSI would be of negligible magnitude and of negligible significance.

Air Quality Changes – Dust Deposition

7.5.261 Air quality changes could occur through fugitive dust caused by construction plant activities. Within 50m of the Order Limits (IAQM, 2014), retained terrestrial habitat receptors within the Colony Bog and Bagshot Heath SSSI may be affected through changes in air quality as the plant communities it supports may experience reduced photosynthesis, respiration and transpiration caused by smothering from dust.

7.5.262 During installation, a dust management plan would be produced, as previously described (G30). The adoption of good practice dust measures to manage the generation of emissions at source and to prevent spread of dust are set out in the REAC in Chapter 16 Environmental Management and Mitigation.

7.5.263 Appendix 13.2 Air Quality Technical Note shows that, taking into account the good practice measures, there are no potentially significant effects in relation to air quality and there is no requirement for mitigation.

7.5.264 Based on this, the potential dust deposition impact is of small magnitude and minor adverse significance.

Table 7.20: Summary of Potential Impacts on Biodiversity - Colony Bog and Bagshot Heath SSSI

Potential Impact	Value	Magnitude	Significance
Colony Bog and Bagshot Heath SSSI (also as component SSSI of Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC)			
Habitat loss/gain, fragmentation or modification			
i. notified habitat features and other habitats	High	Small	Minor
ii. notable plants	High	Negligible	Minor
Habitat supporting faunal interest features of the SSSI			
i. notified species - breeding birds	High	Small	Minor
ii. terrestrial invertebrates	High	Negligible	Minor
Introduction/spread of INNS	High	Negligible	Negligible
Species mortality/injury			
i. notified species - breeding birds	High	Negligible	Negligible
ii. notified species – terrestrial invertebrates	High	Negligible	Minor
Species disturbance – notified species – breeding birds	High	Negligible	Negligible



Potential Impact	Value	Magnitude	Significance
Hydrological changes to groundwater dependent terrestrial ecosystems			
i. Changes to groundwater levels or flows caused by temporary dewatering	High	Negligible	Minor
ii. Changes to groundwater quality from chemical or pollutant leaks or spills	High	Negligible	Negligible
Air quality changes – dust deposition	High	Small	Minor

Chobham Common SSSI/NNR

- 7.5.265 Chobham Common SSSI/NNR is a component SSSI of the Thames Basin Heaths SPA, designated for its breeding bird populations of Dartford warbler, nightjar and woodlark. It is also a component SSSI of the Thursley, Ash, Pirbright and Chobham SAC designated for its Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths and depressions on peat substrates of the *Rhynchosporion*. The site is 655ha in area.
- 7.5.266 In addition, the SSSI is specifically designated for the following notified features: vascular plant assemblage; assemblages of lowland heath breeding birds; invertebrate assemblage (particularly red barbed ant); dry heathland vegetation communities - H2 - *Calluna vulgaris* - *Ulex minor* heath and H3 - *Ulex minor* - *Agrostis curtisii* heath; wet heath vegetation community M16 - *Erica tetralix* - *Sphagnum compactum*; and woodland communities W4 - *Betula pubescens* - *Molinia caerulea* woodland and W5 - *Alnus glutinosa* - *Carex paniculata* woodland.
- 7.5.267 The Order Limits cross Chobham Common SSSI/NNR between Ordnance Survey grid references SU 99014 64629 and SU 96914 63552, covering approximately 14.05 ha of the SSSI. The Order Limits pass through SSSI Units 17, 19, 22 and 23 which were assessed as in unfavourable – recovering condition in 2012 and Units 20 and 25 which were favourable in 2013 (Natural England, undated d). All units comprise dwarf shrub heath habitat with the exception of Unit 20 which is neutral grassland.
- 7.5.268 Preliminary construction drawings illustrating the proposed construction works within the SSSI are provided on figures 7.6 to 7.9. The route is focused along a well-established track across Chobham Common SSSI/NNR, approximately 2.4km in length. Three trenchless crossings (TC024, TC025 and TC026) are proposed in Chobham Common SSSI to cross areas of wetland (Figure 7.8 and 7.9).
- 7.5.269 The proposed method of working seeks to avoid or reduce impacts to soils, vegetation and notable species through the following:
- avoidance of direct impacts to wetland habitat through the use of trenchless construction techniques ((TC024, TC025 and TC026);
 - working width reduced to 15m along and adjacent to the existing track to reduce impacts on Chobham Common SSSI/NNR. 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) (NW23 and 24) (See Figure 7.5);



- where works in wet heath would be unavoidable, effects on soils and surface vegetation would be reduced through the use of ground protection matting and appropriate machinery where practicable (G51);
- topsoil stripping would be reduced to a minimum extent within European sites and SSSIs except where identified within the HRA (some unavoidable stripping would take place as part of the trenching for the pipeline and in construction compounds where matting is not a workable alternative) (HRA4);
- where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40);
- heathland within statutory or non-statutory designated wildlife sites would be reinstated using natural regeneration, unless otherwise agreed with Natural England (HRA1); and
- earth banks within SSSIs which are likely to be of importance for common reptiles and invertebrates should be avoided and protected, where practicable. If their removal is unavoidable during construction, the banks should be reinstated (G57).

7.5.270 The potential impact pathways identified for Chobham Common SSSI/NNR comprise the following and are each detailed, in turn:

- habitat loss/gain, fragmentation or modification;
- introduction/spread of INNS;
- species mortality/injury;
- species disturbance;
- hydrological changes to groundwater dependent terrestrial ecosystems;
- hydrological change – surface water contamination; and
- air quality changes – dust deposition.

Habitat Loss/Gain, Fragmentation or Modification

i) Notified habitat interest features of the SSSI/NNR and other habitats

7.5.271 The Order Limits comprise approximately 14.05ha within the Chobham Common SSSI/NNR. Although the Order Limits have been designed to largely follow an existing track, reducing the construction footprint within the SSSI/NNR, areas of Priority Habitat and Annex I habitats within the Order Limits in the Chobham Common SSSI/NNR remain:

- Priority Habitats:
- Lowland Dry Acid Grassland;
- Lowland Heathland;



- Lowland fen;
- Lowland Mixed Deciduous Woodland;
- Purple Moor-grass and Rush Pastures; and
- Wet Woodland.
- Annex I habitats:
 - H4010 Northern Atlantic wet heaths with *Erica tetralix*;
 - H7150 Depressions on peat substrates of the *Rhynchosporion*;
 - H4030 European dry heaths; and
 - H9190 Old acidophilous oak woods with *Quercus robur* on sandy plains.

7.5.272 Detailed plans showing the location and extent of these habitats are provided on figure A7.1.163 to Figure A7.1.165 in Appendix 7.1 Habitats and Botany Factual Report.

7.5.273 Vegetation clearance would be required in advance of construction works (where these areas were vegetated) to facilitate the movement of construction plant and to displace wildlife from the working area (e.g. reptiles).

7.5.274 Construction activity would be restricted to tracks as far as possible, but habitat adjacent to the track would be temporarily removed to allow for additional working areas where these could not be accommodated within tracks. However, the working width would be reduced to a maximum of 20m (including the track) within the SSSI.

7.5.275 To reduce impacts to ecological receptors at Chobham Common SSSI/NNR, the construction working methods have been adapted at specific locations to take account of individual features of sensitivity. The number of compound and storage areas would be limited to those that were essential to allow construction at that location.

7.5.276 Direct impacts to sensitive wetland habitats would also be avoided through the use of trenchless construction techniques at three locations (TC024, TC025 and TC026). This would avoid the three valleys supporting the Annex I habitats 'Northern Atlantic wet heaths with *Erica tetralix*' and 'Depressions on peat substrates of the *Rhynchosporion*' (Figure A7.1.162 in Appendix 7.1 Habitats and Botany Factual Report). There would therefore be no effects of wet heath habitat loss associated with pipeline installation. Above-ground construction activities in areas supporting these habitats would comprise vehicle and personnel movements and pipe storage, and would be restricted to access tracks or ground protection matting. This would avoid direct impacts on habitats of approximately 8ha in total of the 14.05ha within the Order Limits in the SSSI.

7.5.277 Where open cut installation is necessary narrow width working would be implemented (NW23 and NW24, see Figure 7.5). The approximate habitat areas that would be impacted comprise:

- 0.18ha of semi-natural broad-leaved woodland;
- 0.42ha of unimproved acid grassland;



- 0.06ha of unimproved neutral grassland;
- 0.73ha of dry acid dwarf shrub heath; and
- 0.89ha of common and widespread, non-Priority Habitats.

- 7.5.278 Pipeline installation in dry heath habitat would be constructed using open trench excavation techniques either within or adjacent to the existing track. Where works are required outside of the track, removal of vegetation would be necessary. However, topsoil stripping would be reduced to a minimum extent within European sites and SSSIs except where identified within the HRA (some unavoidable stripping would take place as part of the trenching for the pipeline and in construction compounds where matting is not a workable alternative) (HRA4). Where works in wet heath would be unavoidable, effects on soils and surface vegetation would be reduced through the use of ground protection matting and appropriate machinery where practicable (G51). This would protect the retained soil and its profile from compaction, to maintain the plant communities present and the viability of the seedbank, and to limit change to the nutrient balance of the habitat. Although plant communities underneath the ground protection measures would be flattened they would not be destroyed. Heather and other woody plants would be cut to ground level to promote regrowth from stem bases. Vegetation arisings would be disposed of responsibly. Small quantities may be reused on site to create ecological habitat (G62).
- 7.5.279 Once installation is complete, heathland within statutory or non-statutory designated wildlife sites would be reinstated using natural regeneration, unless otherwise agreed with Natural England (HRA1). This approach is consistent with standard conservation measures for the restoration and management of heathland and there is a high degree of confidence that disturbed habitats would reinstate to pioneer heathland or acid grassland in the short to medium term (Gimingham, 1992). No long-term impacts are anticipated after restoration and regrowth of vegetation.
- 7.5.280 Taking account of the embedded and good practice detailed above, the potential habitat loss/gain, fragmentation impact is of small magnitude and minor adverse significance.
- 7.5.281 This is consistent with the project's HRA Report (**application document 6.5**) which concluded the following for Thursley, Ash, Pirbright and Chobham SAC (of which Chobham Common SSSI is a component):

'The relatively small area of loss with respect to the 'European dry heaths' feature was not likely to be significant within the context of the wider SAC'

'Detailed botanical and vegetation survey and a hydrogeological study of the SAC were undertaken by the applicant in 2018 to support the Stage 2 study. The findings of this work demonstrated that the pipeline route selected would avoid adverse effects to the integrity of the SAC. In particular, the route selection was such that direct and indirect interaction with Annex I wetland qualifying habitats would be avoided entirely or reduced to the 'trivial level' permissible in the Conservation Objectives.'



ii) Notable plants and vascular plant assemblage

- 7.5.282 Temporary habitat loss within the Chobham Common SSSI/NNR could lead to the direct loss of individuals of notable plant species: dodder (rare), common wintergreen (rare), white-beaked sedge (locally frequent) and oblong-leaved sundew (locally frequent) where they are present within the Order Limits. Although notable, these species were not exclusively recorded within the Order Limits and it can be reasonably assumed that the proportion of the populations of the species potentially lost would not be significant compared to populations across the SSSI as a whole.
- 7.5.283 Impacts to white-beaked sedge and oblong-leaved sundew would likely be avoided as these species are located within the Order Limits where trenchless construction is proposed.
- 7.5.284 Where works in wet heath would be unavoidable, effects on soils and surface vegetation would be reduced through the use of ground protection matting and appropriate machinery where practicable (G51). These measures would reduce impacts to soil structure, preserve the seedbank, maintain the plant communities present, and limit changes to the nutrient balance of the habitat. Although plant communities underneath the ground protection measures would be compacted and damaged, they would not likely be destroyed because such works would be undertaken during the plant dormant period (see G38) and some degree of regeneration and re-establishment could be reasonably anticipated in the medium term.
- 7.5.285 Dodder is an annual seed-bearing parasitic plant suggesting few limitations to re-establishment after reinstatement.
- 7.5.286 Due to the rarity and uncertainty relating to the regeneration capabilities of common wintergreen, good practice measures would be implemented. Individual plants of common wintergreen at Chobham Common SSSI, where likely to be affected by construction, would be translocated into suitable receptor locations within the Order Limits where practicable. The location of the receptor site would be determined by the ECoW and protected by an appropriate buffer during the pipeline construction period (G55).
- 7.5.287 Considering the avoidance by use of trenchless techniques in the wet heath areas, reduced working width, reduction of topsoil stripping and implementation of other good practice measures, the potential impact of temporary habitat loss on notable plant species and overall assemblage within Chobham Common SSSI/NNR, is of negligible magnitude and minor adverse significance.

Habitats Used by Interest Feature Species

- 7.5.288 Temporary loss of habitats within Chobham Common SSSI/LNR also has the potential to effect fauna species listed within the SSSI citation: breeding birds (specifically Dartford warbler, nightjar, woodlark as qualifying features of the Thames Basin Heaths SPA) and heathland specialist terrestrial invertebrates, reducing available habitat for feeding, shelter or breeding (and associated behaviours).



i) Breeding birds

- 7.5.289 Dartford warbler, woodlark and nightjar have been recorded within the Order Limits where they cross the Chobham Common SSSI/NNR (2Js Ecology, 2008-18).
- 7.5.290 Potential supporting habitats along the route comprise acid grassland, dry and wet dwarf shrub heath and broadleaved and coniferous woodland. With the exception of wet heath, these habitats would be affected by construction activity.
- 7.5.291 The worst-case area of habitat suitable for these breeding bird species that would be temporarily lost as a result of construction is small compared to the total area of the designated sites: approximately 2% of the overall area of the 655ha Chobham Common SSSI, and 0.17% of the Thames Basin Heaths SPA. All loss of habitat suitable for these bird species would be temporary, as heathland within statutory or non-statutory designated wildlife sites would be reinstated using natural regeneration, unless otherwise agreed with Natural England (HRA1). The affected habitats are anticipated to re-establish to young heathland within the short term (i.e. within five years following completion of construction).
- 7.5.292 During the period of regeneration, there would be a large alternative resource of suitable breeding habitat available for bird interest features within the adjacent heathland. This is supported by a desk study of breeding territories (HRA Report (**application document 6.5**) and Appendix 7.8 Bird Factual Report) which shows that these bird species breed in habitats widely distributed across the SSSIs. This suggests that there is suitable alternative breeding habitat available.
- 7.5.293 Given the localised and temporary scale of habitat loss resulting from the project, any potential effects to the breeding bird interest features of Chobham Common SSSI/NNR via temporary habitat loss is of negligible in magnitude and minor adverse significance.

ii) Terrestrial invertebrates (heathland specialists)

- 7.5.294 The Chobham Common SSSI citation states that the site is particularly important for ants, bees and wasps, aquatic beetles, flies, butterflies and moths and spiders, including 64 rare or scarce species. Given the wide range of terrestrial invertebrate species forming the invertebrate feature of the SSSI, it has been assumed that all habitats within the Order Limits would be suitable to support the populations of invertebrate species comprising this feature.
- 7.5.295 Of particular note is the ant species *Formica rufibarbis* which only exists on mainland Britain in three colonies within Chobham Common SSSI/NNR. The location of nests of this ant species are well recorded and not within the Order Limits (Gammans, 2008). As this species creates new nests at less than 1m from their origin, it is highly unlikely that the project would impact nesting habitat.
- 7.5.296 The worst-case area of heathland habitats within the Order Limits affected by vegetation clearance would be approximately 2% of the total area of the 655ha SSSI. In the context of this much larger resource, the loss of suitable habitat within the Order Limits is therefore unlikely to adversely affect the invertebrate interest of



the SSSI. Moreover, as described above, the loss of habitat within the Order Limits would be temporary.

- 7.5.297 In addition, earth banks within SSSIs which are likely to be of importance for invertebrates should be avoided and protected, where practicable. If their removal is unavoidable during construction, the banks should be reinstated (G57).
- 7.5.298 Furthermore, targeted scrub and secondary woodland within the Order Limits would be removed. Subject to landowner consent, these areas would be reinstated as heathland or acid grassland through natural regeneration (HRA1). This would provide a habitat improvement for heathland invertebrates within the Order Limits.
- 7.5.299 Given the small and temporary loss of suitable habitat, the potential impact is of negligible magnitude and minor adverse significance.

Introduction/Spread of INNS

- 7.5.300 At Chobham Common SSSI/NNR, the legally controlled INNS species montbretia was recorded in the Order Limits. Any further introduction or spread of montbretia, or other species with origins outside of the Order Limits, could potentially cause significant adverse effects to sensitive habitats in Chobham Common SSSI/NNR due to the dominance that INNS can have over native species. Areas of potential risk from INNS within the Order Limits are detailed in Appendix 7.4 Invasive Non-Native Plant Species Factual Report.
- 7.5.301 During construction works, there is potential for soil to be moved around designated sites, and therefore the potential for INNS to be introduced or spread via contaminated machinery or soil. There is also a risk of transferral from pedestrian movement and worker vehicles.
- 7.5.302 However, the potential spread of INNS would be adequately controlled through previously described good practice measures set out in the REAC and secured through DCO requirements such as the CoCP, e.g. reduction of topsoil stripping (HRA4); topsoils and subsoils intended for reinstatement would be temporarily stockpiled as close to where they were stripped from as practicable (G155); and a suitable methodology would be produced to set out how identifiable areas with the potential presence of Schedule 9 plant species or other invasive species would be demarcated, and how any affected soils would be appropriately managed throughout the works (G42).
- 7.5.303 Given the above embedded design and good practice measures, the potential impact of introduction/spread of INNS is of negligible magnitude and negligible significance.

Species Injury/Mortality

- 7.5.304 The process of vegetation removal within Chobham Common SSSI/NNR (and Thames Basin Heaths SPA of which the SSSI is a component site) has the potential to kill or injure species of fauna that are interest features of the SSSI/NNR and qualifying features of the Thames Basin Heaths SPA: breeding birds (Dartford

warbler, nightjar and woodlark as qualifying features of the Thames Basin Heaths SPA, hobby, and other species); and heathland specialist terrestrial invertebrates.

i) Breeding birds

- 7.5.305 It is embedded into the project's construction programme that potentially disturbing construction works within the Thames Basin Heaths SPA would be undertaken between 1 October and 31 January unless otherwise agreed with Natural England (G38). This would avoid the breeding period for all species associated with the SSSI.
- 7.5.306 Minor works in potential breeding habitats but that would not result in disturbance to birds may be undertaken outside this period subject to approval from Natural England e.g. pre-construction surveys, maintenance mowing of cleared vegetation to deter reptiles, dismantling of reptile hibernacula.
- 7.5.307 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 (G35).
- 7.5.308 As such, the potential impact of injury/mortality to breeding birds is of negligible magnitude and negligible significance.

ii) Terrestrial invertebrates (heathland specialists)

- 7.5.309 The Chobham Common SSSI/NNR lists a broad range of heathland invertebrates. It has therefore been assumed that any heathland habitat within the Order Limits could be used by heathland invertebrate species forming this feature.
- 7.5.310 Most invertebrates, including spiders, dragonflies, butterflies, bees, wasps and ants, and true flies, would be dormant during the period when construction would take place within the SSSI. Individuals would be present as eggs, larvae or adults overwintering within vegetation, or in ponds or other waterbodies for invertebrates with aquatic larval stages. As such, individuals in juvenile stages present within vegetation could be injured or killed during vegetation clearance during construction. However, earth banks within SSSIs which are likely to be of importance for invertebrates would be avoided and protected, where practicable. If their removal is unavoidable during construction, the banks would be reinstated (G57). In addition, topsoil stripping would be reduced to a minimum extent within European sites and SSSIs (HRA4), reducing the extent of potential impact.
- 7.5.311 Given the small extent of heathland habitat that would be affected by vegetation clearance relative to the total resource within the SSSI (approximately 2%), the number of individuals potentially injured or killed by construction works is unlikely to be significant for the favourable status of the populations of the species that form the invertebrate feature of the SSSI.



7.5.312 As such, the magnitude of potential impact to the invertebrate feature of the SSSI resulting from mortality or injury is of negligible magnitude and minor adverse significance.

Species Disturbance

7.5.313 Noise, vibration and lighting during the construction works has the potential to disturb SPA qualifying feature and/or SSSI interest features within Chobham Common SSSI/NNR: breeding birds (specifically Dartford warbler, nightjar, woodlark as qualifying features of the Thames Basin Heaths SPA, hobby and specialist heathland bird species) and heathland specialist terrestrial invertebrates.

i) Breeding birds

7.5.314 A detailed assessment with respect to disturbance to the qualifying features of the Thames Basin Heaths SPA is provided in the project's HRA Report (**application document 6.5**).

7.5.315 It is embedded into the project's construction programme that potentially disturbing construction works within the Thames Basin Heaths SPA would be undertaken between 1 October and 31 January unless otherwise agreed with Natural England (G38). The locations of SPA qualifying feature species are shown in Appendix 7.8 Bird Factual Report.

7.5.316 Minor and short-duration works in potential breeding habitats but that would not result in significant disturbance to breeding birds may be undertaken outside this period subject to approval from Natural England e.g. pre-construction surveys, maintenance mowing of cleared vegetation to deter reptiles, dismantling of reptile hibernacula.

7.5.317 However, there is a good practice measure assumption that vegetation with the potential to support bird nests would not to 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 (G35).

7.5.318 As such, the potential impact pathway for significant disturbance to occur on breeding birds of the Thames Basin Heaths SPA and component Chobham Common SSSI is of negligible magnitude and negligible significance.

7.5.319 This is consistent with the HRA Report (**application document 6.5**) which concluded:

"...that on the application of this mitigation, and other relevant good practice measures during construction, no impacts are predicted that could result in an adverse effect on the structure or ecological functioning of the site or the Conservation Objectives that define the favourable status of the qualifying features. The ecological function of supporting habitats within the SPA, such as those used

for nesting, breeding or roosting, or the availability of prey species, would be maintained.”

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

- 7.5.320 Habitats that are dependent on groundwater levels, flows or quality have been identified within Chobham Common SSSI/NNR, as described in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment. The dependency of habitats on groundwater has been assessed as ranging from high to moderate to low (Figures A8.3.31 in Appendix 8.3).
- 7.5.321 Habitats assessed as having a high to moderate groundwater dependency comprise wet dwarf shrub heath, located in valleys and low-lying ground along the Order Limits. A small area of valley mire to the immediately northwest of the Order Limits has a groundwater dependence of moderate. Other habitats assessed as moderate to low groundwater dependence are very small, closely associated with habitats assessed as having a higher groundwater dependence. The dry dwarf shrub heath on the higher ground above the valleys is not groundwater dependent.
- i) *Changes to groundwater levels or flows caused by temporary dewatering*
- 7.5.322 Trenchless pipeline installation methods are proposed in the central and northeastern parts of the Order Limits (TC024, TC025 and TC026, see Figure 7.8 and Figure 7.9). No open cut is proposed in the areas where GWDTE are present. Except at the launch and reception end of the trenchless crossing where shallow excavations equivalent to the depth of a trench would be required, the trenchless installation would dive under the main areas of GWDTE with no dewatering effect. Therefore, no effects resulting from changes to groundwater flows or levels supporting the main areas of GWDTE are expected.
- 7.5.323 Along the open cut sections (Figure 7.8 and Figure 7.9) and the launch and reception of the trenchless crossings the conditions are expected to be wet as construction within the site is expected to take place between 1 October and 31 January. Therefore, localised dewatering would likely be required and so the contractor(s) would ensure that the time the trench is open in the vicinity of certain features, would only be as long as necessary for the installation of the pipeline. The required dewatering of the trench would be undertaken only as and when necessary to enable safe working and preparation for pipe installation (G132).
- 7.5.324 Open cut would take place either within the track or down-gradient of it, to the south. Based on available hydrogeological information (see Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment), surface and sub-surface groundwater flows are likely already altered by the existing track, so whether the pipeline is installed within the track or immediately downgradient of it, a highly localised effect of dewatering is expected. In addition, temporary stanks would be installed within the trench prior to undertaking dewatering/draining activities, to prevent migration of water within the trench (G134).
- 7.5.325 As the GWDTE near to areas requiring dewatering have been determined as either absent or of low groundwater dependency and the anticipated dewatering impact



would be highly localised, the potential effect of dewatering on the GWDTE habitat of the Chobham Common SSSI/NNR is negligible and of negligible significance.

ii) Changes to groundwater quality from chemical or pollutant leaks and spills

7.5.326 In the unlikely event of chemical or pollutant leaks or spills during construction there is a risk to groundwater quality of upon which GWDTE are dependent. This could lead to potential effects to wet dwarf shrub heath GWDTE habitats of Chobham Common SSSI/NNR resulting in their loss, fragmentation or modification.

7.5.327 Good practice measures set out in the REAC and secured through DCO requirements such as the CoCP would be implemented to reduce the risk of potential pollution effects. Measures would include:

- appropriate storage and handling of fuels and other substances hazardous to the environment (G8);
- potentially hazardous materials used during construction would be safely and securely stored including use of secondary containment where appropriate (G119);
- 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 (G121);
- fuels, oils and chemicals would be stored responsibly, away from sensitive water receptors. They would be stored >15m from watercourses, ponds and GWDTE (G142); and
- 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 (G117).

7.5.328 In addition to the above measures, as construction within most of the Order Limits would be in drier, unsaturated areas, in the unlikely event of a spillage there would be some attenuation of the released pollutant as it infiltrates the unsaturated zone. This would further limit the potential impact to groundwater sources supplying GWDTE.

7.5.329 Based on the above, the potential effects of changes to groundwater quality from chemical or pollutant leaks and spills on the GWDTE of Chobham Common SSSI/NNR would be of negligible magnitude and of negligible significance.

Hydrological Change – Surface Water Contamination

7.5.330 Construction activities would be located within the surface water catchment of the Chobham Common SSSI/NNR. The Order Limits cross two unnamed minor watercourses (WCX073 and WCX076) and Glovers Pond is located on the southern boundary (which although would be protected from construction works) could have a surface water connection with the project. Potential impacts to sensitive habitats



or species of the SSSI could arise from the release of sediment or chemical pollutants into these water features. Potential hydrological changes are detailed in Chapter 8 Water and include predicted change to surface water quality within affected watercourses.

- 7.5.331 However, these watercourses would be crossed using trenchless techniques (TC024, TC025 and TC026) and so no direct impacts would arise.
- 7.5.332 The implementation of previously described good practice measures with respect to pollution prevention (e.g. G8, G11, G12, G39, G119, G121, G122 and G142) is set out in the REAC and would further reduce the likelihood of any potential impact.
- 7.5.333 Considering the embedded and good practice measures, the potential for surface water contamination impacts on sensitive features at Chobham Common SSSI/NNR is highly unlikely. As such, there would be a negligible magnitude of change and negligible significance.

Air Quality Changes – Dust Deposition

- 7.5.334 Air quality changes could occur through fugitive dust caused by construction plant activities. Within 50m of the Order Limits (IAQM, 2014), retained terrestrial and freshwater habitat receptors within the Chobham Common SSSI/NNR may be affected through changes in air quality as the plant communities it supports may experience reduced photosynthesis, respiration and transpiration caused by smothering from dust.
- 7.5.335 During construction, a dust management plan would be produced, as previously described (G30). The adoption of good practice dust measures to manage the generation of emissions at source and limit the spread of dust produced are set out in the REAC.
- 7.5.336 Appendix 13.2 Air Quality Technical Note shows that, taking into account the good practice measures, there are no potentially significant effects in relation to air quality and there is no requirement for mitigation.
- 7.5.337 Based on this, the potential of dust deposition is of small magnitude and minor adverse significance.

Table 7.21: Summary of Potential Impacts on Biodiversity - Chobham Common SSSI and NNR

Potential Impact	Value	Magnitude	Significance
Chobham Common SSSI and NNR (also as component SSSI of Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC)			
Habitat loss/gain, fragmentation or modification			
i. notified habitat features and other habitats	High	Small	Minor
ii. notable plants and vascular plant assemblage	High	Negligible	Minor
Habitat loss/gain, fragmentation or modification			
i. notified species - breeding birds	High	Negligible	Minor
ii. notified species - terrestrial invertebrates	High	Negligible	Minor
Introduction/spread of INNS	High	Negligible	Negligible
Species mortality/injury			
i. notified species - breeding birds	High		Negligible



Potential Impact	Value	Magnitude	Significance
ii. notified species – terrestrial invertebrates	High	Negligible Negligible	Minor
Species disturbance – notified species – breeding birds	High	Negligible	Negligible
Hydrological changes to groundwater dependent terrestrial ecosystems			
i. changes to groundwater levels or flows caused by temporary dewatering	High	Negligible	Minor
ii. changes to groundwater quality from chemical or pollutant leaks or spills	High	Negligible	Minor
Hydrological change – surface water contamination	High	Negligible	Negligible
Air quality changes – dust deposition	High	Small	Minor

Dumsey Meadow SSSI

- 7.5.338 Dumsey Meadows SSSI is designated for its unimproved vegetation community MG5 - *Cynosurus cristatus* - *Centaurea nigra* grassland. Condition assessment of the site in 2012 identified the single unit site as in favourable condition.
- 7.5.339 The Order Limits intersect a small area (<0.04ha) of Dumsey Meadows SSSI for a distance of approximately 55m along its eastern boundary. However, the pipeline would be installed by trenchless techniques at this location (TC034) as part of the River Thames watercourse crossing (WCX096b).
- 7.5.340 The potential impact pathways identified for Dumsey Meadows SSSI comprise the following and are each detailed, in turn:
- habitat loss/gain, fragmentation or modification;
 - introduction/spread of INNS;
 - hydrological changes to groundwater dependent terrestrial ecosystems; and
 - air quality changes – dust deposition.

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.341 The pipeline at this location would be drilled under the River Thames (TC034). As such, the adjacent Dumsey Meadow SSSI would not be directly impacted. Although the Order Limits extend into the Dumsey Meadow SSSI, all works in this area would be subsurface avoiding any above-ground habitat loss, fragmentation or modification.
- 7.5.342 As such, there would be no habitat loss/gain, fragmentation or modification and a negligible effect is predicted.

Introduction/Spread of INNS

- 7.5.343 The INNS Himalayan balsam, Himalayan giant bramble (*Rubus armeniacus*) and Michaelmas daisy (*Aster* sp.) were recorded in Dumsey Meadow SSSI during field survey. Any further introduction or spread of INNS, or other species with origins outside of the Order Limits, could potentially cause significant adverse effects to sensitive habitats in Dumsey Meadow SSSI due to the dominance that INNS can

have over native species. Areas of potential risk from INNS within the Order Limits are detailed in Appendix 7.4 Invasive Non-Native Plant Species Factual Report.

- 7.5.344 There would be no construction works within Dumsey Meadows SSSI as the pipeline would be installed through trenchless techniques at this location (TC034). As such, there is negligible potential to introduce or spread INNS due to the movement of contaminated soil or machinery.
- 7.5.345 Furthermore, the potential spread of INNS would be controlled through good practice measures set out in the REAC and secured through DCO requirements such as the CoCP. A suitable methodology would be produced to set out how identifiable areas with the potential presence of Schedule 9 plant species or other invasive species would be demarcated, and how any affected soils would be appropriately managed throughout the works (G42).
- 7.5.346 As such, potential effects are of negligible magnitude and negligible significance.

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

- 7.5.347 Habitats that are dependent on groundwater levels, flows or quality have been identified within Dumsey Meadow SSSI, as described in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment. The dependency of the unimproved MG5 grassland on groundwater has been assessed as low. Areas of low to moderate dependency on groundwater are located within topographic hollows within the floodplain (Figure A8.3.39 in Appendix 8.3).

i) Changes to groundwater levels or flows caused by temporary dewatering

- 7.5.348 The construction method for pipeline installation near to Dumsey Meadow SSSI would be by trenchless crossing of the River Thames (Figure A8.3.37 in Appendix 8.3). The launch and reception areas for the crossing would be at a distance of approximately 100m either side of the boundary of the SSSI. The River Thames likely forms a hydrogeological barrier between the SSSI and launch area to the south. Given that dewatering would not take place near to the SSSI nor the majority of the site, including its notified features which have no or are of low to moderate groundwater dependency, potential effects of loss, modification or fragmentation of habitat within the SSSI would not occur as a result of dewatering.

ii) Changes to groundwater quality from chemical or pollutant leaks and spills

- 7.5.349 Given the distance between Dumsey Meadow SSSI and installation operations, in the unlikely event of pollutant leaks or spills during construction, they are highly unlikely to reach groundwater supplying GWDTE within the SSSI. Potential effects resulting through this impact pathway would not occur.

Air Quality Changes – Dust Deposition

- 7.5.350 Air quality changes could occur through fugitive dust caused by construction plant activities. Within 50m of the Order Limits (IAQM, 2014), terrestrial habitat receptors within the Dumsey Meadow SSSI may be affected through changes in air quality as



the plant communities of the SSSI may experience reduced photosynthesis, respiration and transpiration caused by smothering from dust.

7.5.351 However, due to the trenchless construction techniques proposed at this location (TC034), the closest above ground construction works areas would be approximately 75m away on the southern side of the River Thames at Chertsey Meads. As the effects of dust deposition are only significant at locations within 50m of source activities (IAQM, 2014), significant effects to Dumsey Meadow SSSI would not arise.

Table 7.22: Summary of Potential Impacts on Biodiversity - Dumsey Meadow SSSI

Potential Impact	Value	Magnitude	Significance
Dumsey Meadow SSSI			
Habitat loss/gain, fragmentation or modification	High	Negligible	Negligible
Introduction/spread of INNS	High	Negligible	Negligible
Hydrological changes to groundwater dependent terrestrial ecosystems			
i. changes to groundwater levels or flows caused by temporary dewatering	High	Potential Impact Avoided	
ii. changes to groundwater quality from chemical or pollutant leaks or spills	High	Potential Impact Avoided	
Air quality changes – dust deposition	High	Potential Impact Avoided	

Chertsey Meads LNR

7.5.352 The Order Limits cross Chertsey Meads LNR and SNCI between Ordnance Survey grid references TQ 05812 66115 and TQ 05928 66651. The potential impacts on biodiversity features of Chertsey Meads are assessed with respect to the site's status as a SNCI. As such, this information is provided in the non-statutory designated site section of this chapter (paragraphs 7.6.370 to 7.6.555).

South West London Waterbodies SPA/Ramsar (and Staines Moor SSSI)

7.5.353 The Staines Moor SSSI is a component of the South West London Waterbodies SPA and Ramsar site. It is located approximately 650m west of the Order Limits in Section H. Designated for wetland habitats supporting important bird assemblages, notably gadwall and shoveler, there are possible impacts pathways to these sites during construction of the project.

7.5.354 A detailed assessment with respect to the qualifying features of the South West London Waterbodies SPA/Ramsar is provided in the project's HRA Report (**application document 6.5**).

7.5.355 The potential impact pathways identified for Staines Moor SSSI and South West London Waterbodies SPA/Ramsar comprise the following and are each detailed, in turn:

- species disturbance; and
- hydrological change – surface water contamination.



Species Disturbance

- 7.5.356 There is a theoretical disturbance pathway to wintering bird species associated with the South West London Waterbodies SPA/Ramsar and component Staines Moor SSSI. For the duration of construction of the project there would be changes to noise and visual stimuli generated by movement of plant and personnel within the construction area. Anthropogenic noise and visual changes have well-documented disturbance effects on bird species, resulting in both behavioural and population changes (Latimer, *et al.*, 2003).
- 7.5.357 There is no current authoritative guidance on how far a noise study area should extend from construction activities due to the variability of the potential noise generating activities and plant used. However, the effects of noise (as well as visual/human presence) are only likely to be significant where the route extends within or is directly adjacent to the boundary of the designated site, or within/adjacent to an offsite area of known foraging, roosting or breeding habitat that supports mobile animal species for which a site is designated.
- 7.5.358 Given the above, the project is considered sufficiently distant from the SSSI/SPA/Ramsar (650m) and project activities relatively minor in the disturbance generated (e.g. there would be no major disturbance events, such as rock blasting or other controlled explosions and piling.) that noise disturbance is unlikely to have any effect on bird species within the sites. Similarly, at such a distance visual disturbance to the SPA would not be expected to result from project activities.
- 7.5.359 Outside of the SPA, disturbance may result from the project where the route is near to other areas that the qualifying species use during the winter. The southwest London area supports a complex of waterbodies that are important for the maintenance of the qualifying species of the SPA, beyond those that are specifically included in the designation. The lakes along Littleton Lane, the Queen Mary Reservoir and the lakes to the west of the reservoir, and the lakes comprising the former Princes Club Watersports Park are recognised as forming part of this wider complex. The former two are also designated as Important Bird Areas, and the qualifying features of the SPA are known to have used these waterbodies, albeit in small numbers (Briggs, 2007). As the timing of the works in this section of the route have yet to be confirmed, there is the potential for project activities to cause noise or visual disturbance during the winter when the qualifying species might be present.
- 7.5.360 The route runs to the west of Littleton Lane, through a gravel extraction site and arable fields (Figure 7.4). There are continuous rows of scrub and hedgerow either side of the length of Littleton Lane, screening the lakes to the east. In the southern half of the Lane, between the Order Limits and the lakes to the west (approximately 165m) there are industrial facilities, and to the north a large area of arable fields. The lake to the east of Littleton Lane is used by the Littleton Sailing Club (TQ 060 674) and there are residential areas adjacent to the lakes to the northeast.
- 7.5.361 The above description demonstrates that there are existing noise and visual disturbance pressures to these lakes, including disturbance from the M3 motorway, recreation and industry. Although the current importance of these waterbodies to the SSSI/SPA is unknown, given this context it is likely that if birds of the qualifying species do use these waterbodies during the winter then they are habituated to the



existing levels of disturbance. Moreover, as there are many waterbodies in the surrounding southwest London area, there is sufficient habitat for birds to move to during peak disturbance events at the Littleton Lane waterbodies (including undisturbed locations of the same water body). Furthermore, as the pathway for noise and visual disturbance arising from project activities is to some extent buffered by trees or built-up areas between Littleton Lane and the waterbodies as described above, then any increased noise or visual stimuli arising from the project are considered likely to be mitigated by these existing buffers.

- 7.5.362 The Order Limits pass near to Queen Mary Reservoir and a series of small waterbodies to its west run approximately 350m to the west of the reservoir adjacent to a residential area. The embankment of the Queen Mary reservoir is around 12m higher than the surrounding land (Engineering-Timelines, 2008), and there is dense scrub and woodland around the lakes to the west (Google Earth, 2018). The surrounding area is also highly disturbed, with an active gravel works, roads and residential areas. Given the small scale of the construction works required for the project and existing levels of disturbance, the embankment and woody habitats are considered likely to provide effective screens to any additional noise or visual stimuli arising from the project that could affect qualifying species on the reservoir or lakes. Moreover, given the probability of habituation to noise and visual disturbance of any birds of the qualifying species using these waterbodies and the resource of alternative waterbodies in the southwest London area, should any disturbance result from project activities then it is considered unlikely to be significant to the SPA.
- 7.5.363 The Order Limits run to the west of the waterbodies comprising the former Princes Club Watersports Park, north of Ashford. Between the Order Limits and the waterbodies to the east there is a continuous line of mature scrub and trees along the boundary between the playing fields and a former club house of the watersports park (Google Earth, 2018), which is considered to provide a screen for noise and visual disturbance effects arising from construction within the Order Limits and the waterbodies to the east. Given the likely habituation to noise and visual disturbance of any birds of the qualifying species using these waterbodies and the resource of alternative waterbodies in the southwest London area, should any disturbance result from project activities then it is considered unlikely to be significant to the SPA.
- 7.5.364 Despite the above, over-wintering bird species using waterbodies near to the Order Limits would readily be able to disperse and find alternative nearby habitat if disturbed as a result of project activities. There are also existing structures and vegetation between the route and nearby waterbodies that would buffer noise or visual stimuli. Existing levels of noise and visual disturbance along the route are also such that birds are likely habituated to anthropogenic disturbance similar to that generated by the project.
- 7.5.365 As such, the potential impact of disturbance on qualifying or interest features of the South West London Waterbodies SPA, Ramsar and component SSSIs is considered to be of negligible magnitude and negligible significance.

Hydrological Change – Surface Water Contamination

- 7.5.366 Hydrological links between the project and the Staines Moor SSSI, via the Staines Reservoir Aqueduct, have been identified. Potential impacts to sensitive habitats or

species of the SSSI could arise from the release of sediment or chemical pollutants into this feeder watercourse.

- 7.5.367 The project has very low potential to generate contamination to surface water bodies connected to the SSSI/SPA/Ramsar during construction. The Order Limits are approximately 650m from the SPA/Ramsar. The crossing of surface water features with connectivity to SPA-linked waterbodies would be achieved through trenchless construction techniques. Trenchless techniques would be used to cross Queen Mary Reservoir Intake Canal (TC 037) to reduce obstruction to the canal and the habitats within it. Trenchless techniques would also be used to go under the Staines Bypass, the River Ash and Woodthorpe Road from Fordbridge Park (TC 039).
- 7.5.368 The implementation of previously described good practice measures with respect to pollution prevention (e.g. G8, G11, G12, G39, G119, G121, G122 and G142) are set out in the REAC and would further reduce the likelihood of any potential impact.
- 7.5.369 As such, the potential for contamination of waterbodies connected to the SSSI/SPA/Ramsar is extremely remote. The potential impact is of negligible magnitude and negligible significance.

Table 7.23: Summary of Potential Impacts on Biodiversity - Staines Moor SSSI and South West London Waterbodies SPA, Ramsar

Potential Impact	Value	Magnitude	Significance
Staines Moor SSSI and South West London Waterbodies SPA, Ramsar			
Species disturbance	High	Negligible	Negligible
Hydrological change – surface water contamination	High	Negligible	Negligible

Non-statutory Designated Sites

- 7.5.370 Non-statutory designated sites that are included in this assessment comprise:
- Hampshire – SINCS and RVEI;
 - Surrey – SNCI and Conservation Verges; and
 - Greater London – SMI and SBI.
- 7.5.371 The potential impact pathways identified for non-statutory designated sites comprise the following:
- habitat loss/gain, fragmentation or modification;
 - introduction/spread of INNS;
 - species disturbance;
 - hydrological changes to groundwater dependent terrestrial ecosystems;
 - hydrological change – surface water contamination; and
 - air quality changes – dust deposition.
- 7.5.372 Table 7.15 details each non-statutory site where an effect pathway for each potential impact has been identified. Due to the number of non-statutory designated sites potentially impacted by the project, the assessment on non-statutory designated

sites is impact-led, rather than receptor-led assessment, as presented for the statutory designated sites.

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.373 The presence of non-statutory sites was taken into consideration during the design process, as described in Chapter 4 Design Evolution. The Order Limits crosses 24 non-statutory designated sites (see Figure 7.2 and Table 7.15).
- 7.5.374 Where above-ground works are proposed within non-statutory designated sites, temporary habitat loss would arise during the construction period. Tables 7.16 and 7.17 summarise the approximate area of habitat lost within each non-statutory designated site and its proportion of the site as a whole. However, it is important to note that habitat that could potentially be impacted does not in all cases contribute positively to the respective designated site e.g. encroaching scrub are not desirable habitats within some grassland SINC, and where this occurs it is taken account in the assessment for the respective site.
- 7.5.375 Where the route could not avoid non-statutory designated sites, the design has been adapted to reduce impacts, where practicable. For example, by reducing the working width within the Order Limits to reduce disturbance to habitat or by adopting an alignment to pass through gaps in treelines or woodland. At some locations, the Order Limits have been aligned to intersect habitats that are less sensitive to ground disturbance, are in poor/degraded condition, or do not make a positive contribution to the respective non-statutory designated site.
- 7.5.376 A summary of the potential impacts at each non-statutory site, listed from south to north within the Order Limits, is provided below where habitat loss/gain, fragmentation or modification might arise. The predicted habitat losses and gains within each site are then summarised in Table 7.24 (for Hampshire) and Table 7.25 (for Surrey).

Hampshire: Eastleigh Borough Council

i) Maddoxford Farm Meadows SINC (Section A)

- 7.5.377 Maddoxford Farm Meadows SINC (Figure 7.2) comprises fens, flushes, seepages, springs, and inundation grasslands that support a flora and fauna characteristic of unimproved and waterlogged (seasonal or permanent) conditions. The site was surveyed as part of the wider Ford Valley (see Appendix 7.1 Habitats and Botany Factual Report) where Coastal and Floodplain Grazing Marsh Priority Habitat was recorded, see Figure A7.1.5 in Appendix 7.1 Habitats and Botany Factual Report.
- 7.5.378 Trenchless construction techniques would be implemented at this location (TC001), comprising the subsurface drilling of the pipeline. There would be no above-ground construction works within this site. As such, no pathway to effects by habitat loss/gain, fragmentation or modification is anticipated for Maddoxford Farm Meadows SINC and so a negligible effect is anticipated.



Hampshire: Winchester City Council and South Downs National Park

i) Brockwood Copse and Roadside Strips SINC (Section A)

- 7.5.379 The Order Limits (sub-option A2b only) intersect this SINC at Riversdown Road. However, to avoid impacts to the SINC and associated Ancient Woodland, trenchless construction techniques comprising the subsurface drilling of the pipeline would be implemented at this location (TC003). As such, there would be no pipeline installation works within this site.
- 7.5.380 Access to a site compound would be achieved through two existing farmer's access points off Riversdown Road. One of the access points that allows access to the south of Riversdown Road passes through the SINC. However, this access point has been aligned to make use of an existing farmer's gate and so a new gap in the woodland and hedgerow at this location would not be required.
- 7.5.381 Working widths would be reduced in specific locations where trees or hedges are present. Where notable trees are intended to be retained within or immediately adjacent to the Order Limits, the trees and their root protection areas would be protected where they extend within the Order Limits and are at risk. This would be by means of fencing or other measures (G65). The contractor(s) would consider and apply, where practicable, 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). This would be applied to trees within the Order Limits which would be preserved through the construction phase, and to trees outside of the Order Limits where such measures do not hinder or prevent the use of the relevant working width for construction (G95).
- 7.5.382 As such, potential effects of habitat loss/gain, fragmentation or modification to the SINC is considered small in magnitude and minor adverse significance.

Hampshire: East Hampshire District Council

i) Water Lane SINC (Section C)

- 7.5.383 Water Lane SINC is designated for its ancient semi-natural woodland habitat. It is a linear site of approximately 1.8km in length. The Order Limits have been designed to avoid Ancient Woodland.
- 7.5.384 The Order Limits intersect the SINC at an existing farmer's access track at which location there are several wide gaps in the tree line. Pipeline installation at this location would therefore seek to utilise existing gaps and the working width would be reduced to 10m (project commitment O1). At this location, a gap of approximately 10m is present and the SINC is devoid of sensitive woodland or ground flora interest. As such, potential impacts on the SINC and the Ancient Woodland habitat would be avoided.
- 7.5.385 Working widths would be reduced in specific locations where trees or hedges are present. Where notable trees are intended to be retained within or immediately adjacent to the Order Limits, the trees and their root protection areas would be



protected where they extend within the Order Limits and are at risk. This would be by means of fencing or other measures (G65).

- 7.5.386 It is not expected that valuable soils associated with Ancient Woodland would be present within the Order Limits at this location. This is due to regular ground disturbance caused by agricultural machinery using this access point. Despite this, good practice measures with respect to soils would be applied (G150), as set out in the REAC.
- 7.5.387 As such, potential effects of habitat loss/gain, fragmentation or modification to the SINC is negligible in magnitude and of minor significance.

Hampshire: Hart District Council

- 7.5.388 Within Hart District, the Order Limits pass through Ewshot Meadows SINC, Meadow Near Soanes Copse SINC and Wakefords Copse, Crondall SINC.

i) Ewshot Meadows SINC (Section D)

- 7.5.389 Ewshot Meadows SINC is designated for its agriculturally unimproved grasslands and fens, flushes, seepages, springs, inundation grasslands that support a flora and fauna characteristic of unimproved and waterlogged (seasonal or permanent) conditions. Detailed botanical study (see Appendix 7.1 Habitats and Botany Factual Report) identified the following Priority Habitats within the Order Limits: Lowland Mixed Deciduous Woodland; Purple Moor-grass and Rush Pastures; and Wet Woodland.
- 7.5.390 Although some of these habitats are marginally impacted, the majority of the Order Limits pass through grassland of limited biodiversity interest and avoid these more sensitive habitats (see Figure A.7.1.81 to Figure A7.1.84).
- 7.5.391 Following engagement feedback (Hart District Council's Biodiversity Officer), the Order Limits were aligned to encompass as much scrub as possible within the SINC and adjacent grassland. This scrub is encroaching into areas of grassland and is considered to be detrimental to the conservation status of the SINC (pers. comm, Hart District Council's Biodiversity Officer). The removal of this scrub as a consequence of pipeline installation works would result in a habitat improvement.
- 7.5.392 In addition, the construction working width within the SINC and adjacent Crookham Park SANG would be reduced to 15m to reduce impacts on Ewshot Meadows SINC and SANG over an approximate distance of 356m (grid ref: SU81369 50606 to SU81529 50923) (NW8) (Figure 7.5). This would reduce impacts to the grassland and mature trees at this location.
- 7.5.393 During construction, topsoils and subsoils intended for reinstatement would be temporarily stockpiled as close to where they were stripped from as practicable (G155). The contractor would also produce a Soil Management Plan (G150).
- 7.5.394 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). Vegetation clearance, retention, protection and

replanting/reinstatement drawings would be produced prior to the construction phase. The contractor(s) would implement these plans including agreed mitigation where practicable (G87).

7.5.395 Temporary loss of the minor areas of Lowland Mixed Deciduous Woodland (0.34ha) and Purple Moor-grass and Rush Pastures (0.11ha) Priority Habitats within Ewshot Meadows is considered to be an impact of increased magnitude due to the uncertainty in success of reinstatement of these woodland and wet grassland habitat types. Potential wetland habitat loss within these non-statutory designated sites are considered to be of small magnitude and minor adverse significance.

ii) Meadow Near Soanes Copse SINC (Section D)

7.5.396 Meadow Near Soanes Copse SINC is designated as an impoverished grassland with elements of relic unimproved grassland to enable recovery. Although the Order Limits encroach into the boundary of the Meadow Near Soanes Copse SINC by approximately 10m, the Limits of Deviation where construction works would occur avoid the SINC grassland habitats and are restricted to the carriageway and verge. Street work construction techniques would therefore be implemented along Naishes Lane.

7.5.397 Meadow Near Soanes Copse SINC would be protected from construction works through the use of buffer zones. Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).

7.5.398 Given these measures, no pathway to effects by habitat loss/gain, fragmentation or modification is anticipated for Meadow Near Soanes Copse SINC and so a negligible effect is predicted.

iii) Wakefords Copse, Crondall SINC (Section D)

7.5.399 Detailed botanical survey of Wakefords Copse, Crondall SINC (Figure A7.1.87 to A7.1.89 in Appendix 7.1 Habitats and Botany Factual Report) identified a mixed woodland canopy with some areas dominated by young pedunculate oak trees, silver birch or a combination of the two. The was dominated by holly, and in some areas, bracken and bramble. The ground flora was species-poor across most of the site, but the wayleave of the existing Esso pipeline (which partially passes through this site already) supported a richer ground flora.

7.5.400 Wakefords Copse is not included in the Ancient Woodland Inventory but is designated for supporting Ancient Woodland, or wood pasture or former wooded common. Most of the surveyed area was shown as un-wooded on the 1888 Ordnance Survey map (National Library of Scotland, 2017) and from field survey appeared to be of recent secondary origin. Therefore, the area of Wakefords Copse, Crondall SINC within the Order Limits is not considered to be Ancient Woodland.



- 7.5.401 The SINC would be directly impacted by excavation necessary to create trenches for pipe laying. However, soils containing the seedbank of any long-lived woodland ground flora would be retained and reinstated post-construction. The working width would also be limited to a maximum of 15m (NW9) (Figure 7.5), further reducing potential effects.
- 7.5.402 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). 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 (G97). This would avoid permanent loss of woodland habitat and to maintain habitat connectivity in the medium to long term.
- 7.5.403 In addition, the working width would be 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) (NW9) (Figure 7.5).
- 7.5.404 The botanical survey (see Appendix 7.1 Habitats and Botany Factual Report) identified a relatively richer ground flora on the wayleave of the existing Esso pipeline than that of the rest of the woodland, which had not undergone any additional ecological mitigation post-construction. This suggests that the re-establishment method employed then, and the similarly proposed reinstatement of soils and natural regeneration now (e.g. G155 and G150, as set out in the REAC), could result in relatively improved ground flora diversity and distribution than that of the retained woodland site.
- 7.5.405 The potential habitat loss within Wakefords Copse, Crondall SINC is considered to be of small magnitude and minor adverse significance.

Hampshire: Rushmoor Borough Council

- 7.5.406 Within Rushmoor Borough, the Order Limits encompass part of Pyestock Hill/Pondtail Heath SINC, Pyestock (North Grasslands) SINC, South of Ively Road SINC, Cove Brook Grassland SINC, Cove Valley Southern Grassland SINC, and Blackwater Valley, Frimley Bridge SINC. These are each discussed below.
- i) Pyestock Hill/Pondtail Heath SINC (Section D)*
- 7.5.407 Pyestock Hill/Pondtail Heath SINC is designated for its heathland and afforested heathland habitats and the presence of notable species.
- 7.5.408 However, the Order Limits are largely confined to an existing bare earth clearing that would be used for working compounds associated with the trenchless crossing of the Basingstoke Canal and A323 (TC013). These bare earth areas support minimal biodiversity interest, as shown in Appendix 7.1 Habitats and Botany Factual Report.
- 7.5.409 The Order Limits at Pyestock Hill/Pondtail Heath SINC also enclose an area of dense/continuous scrub and plantation coniferous woodland. These habitats would not be affected by construction activity, being avoided through the use of trenchless



construction techniques as part of the Basingstoke Canal SSSI and A323 road crossing (TC013). Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).

7.5.410 Considering the habitats present and the scope of works proposed at these sites, the potential habitat loss impact on Pyestock Hill/Pondtail Heath SINC is considered negligible in magnitude and minor adverse significance.

ii) Pyestock (North Grasslands) SINC (Section D)

7.5.411 A logistics hub is proposed at Hartland Park Village, which is currently a residential development site. The Order Limits at this location include the Pyestock (North Grasslands) SINC, with Pyestock (Fairway) SINC to the immediate south.

7.5.412 However, the habitats associated with these SINC's have been subject to translocation to a receptor site at Bramshot Common SINC (see Figure 7.2) as part of the third-party Hartland Park Village residential development (The Ecological Mitigation and Enhancement Plan, June 2018 (Hart District Council application ref: 17/00471/CON)). This receptor site is approximately 90m north of the Order Limits and would be unaffected.

7.5.413 As such, no pathway to effect exists with respect to habitat loss at Pyestock (North Grasslands) SINC and Pyestock (Fairway) SINC.

iii) South of Ively Road SINC (Section D)

7.5.414 Although the South of Ively Road SINC is located within the Order Limits, narrow working techniques would be implemented 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), in the carriageway enabling the sensitive habitats of the SINC to be avoided (NW15) (Figure 7.5).

7.5.415 The contractor(s) would consider and apply, where practicable, 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)). This would be applied to trees within the Order Limits which would be preserved through the construction phase, and to trees outside of the Order Limits where such measures do not hinder or prevent the use of the relevant working width for construction (G95).

7.5.416 Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).



- 7.5.417 As such, to the potential effect of habitat loss/gain fragmentation or modification on South of Ively Road SINC is of negligible magnitude and minor adverse significance.
- iv) Cove Brook Grassland SINC (Section E)*
- 7.5.418 Cove Brook Grassland SINC is designated for its fens, flushes, seepages, springs and inundation grasslands that support a flora and fauna characteristic of unimproved and waterlogged (seasonal or permanent) conditions. The site underwent detailed botanical survey, as shown in Appendix 7.1 Habitats and Botany Factual Report, which identified Lowland Mixed Deciduous Woodland and Coastal and Floodplain Grazing Marsh Priority Habitats within the Order Limits.
- 7.5.419 Following engagement feedback (Rushmoor Borough Council's Biodiversity Officer), the construction working width would be 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) (NW 16) (Figure 7.5). The Order Limits also encompass an existing bare earth footpath and so habitat losses would also be reduced where construction activity is positioned on the path.
- 7.5.420 During installation the contractor(s) would consider and apply, where practicable, 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)). This would be applied to trees within the Order Limits which would be preserved through the construction phase, and to trees outside of the Order Limits where such measures do not hinder or prevent the use of the relevant working width for construction (G95).
- 7.5.421 Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).
- 7.5.422 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). 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 (G97). This would avoid a net loss of woodland habitat and to maintain habitat connectivity in the medium to long term.
- 7.5.423 Given the position of the Order Limits, the temporary habitat losses within this site would comprise woodland habitat and species-poor rank grassland which are not primary features of this grassland SINC.
- 7.5.424 As such, the potential habitat loss impact on Cove Brook Grassland SINC is of small magnitude and minor adverse significance.



v) *Cove Valley, Southern Grassland SINC (Section E)*

- 7.5.425 Cove Valley Southern Grassland SINC is designated for its semi-natural woodland that comprises important community types of restricted distribution in the County and grasslands which have become impoverished through inappropriate management but which retain sufficient elements of relic unimproved grassland to enable recovery. Detailed botanical survey was undertaken at this location (Appendix 7.1 Habitats and Botany Factual Report) which identified Lowland Mixed Deciduous Woodland, Wet Woodland and Coastal and Floodplain Grazing Marsh Priority Habitats within the Order Limits.
- 7.5.426 Construction works within the SINC would result in the temporary loss of approximately 0.74ha of Woodland Priority Habitats and 0.86ha of Coastal and Floodplain Grazing Marsh Priority Habitat.
- 7.5.427 During installation, the construction working width would be 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) (NW 16) (Figure 7.5).
- 7.5.428 In addition, the contractor(s) would consider and apply, where practicable, 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)). This would be applied to trees within the Order Limits which would be preserved through the construction phase, and to trees outside of the Order Limits where such measures do not hinder or prevent the use of the relevant working width for construction (G95).
- 7.5.429 Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).
- 7.5.430 Where woodland habitats require removal, appropriate techniques would be used for the removal, storage and translocation of any vegetation which is to be reused, relocated or transplanted (G89). 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). 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 (G97). This would be planted to avoid a net loss of woodland habitat and to maintain habitat connectivity in the medium to long-term.
- 7.5.431 This would result in a potential impact of small magnitude and minor adverse significance.



Hampshire/Surrey Border: Blackwater Valley, Frimley Bridge SINC and Frimley Hatches (including Frimley Reedbeds) SNCI (Section E)

- 7.5.432 The River Blackwater forms the border between Hampshire and Surrey, and part of the floodplain to the west, within Hampshire, is designated as Blackwater Valley, Frimley Bridge SINC. Part of the floodplain to the east, within Surrey, is designated Frimley Hatches (including Frimley Reedbeds) SNCI. The Order Limits pass through both designated sites. Blackwater Valley, Frimley Bridge SINC and Frimley Hatches (including Frimley Reedbeds) SNCI are designated for the following features: wet woodland; semi-improved grassland which retain elements of unimproved grassland; heathland vegetation; wetland habitats; and associated assemblages of fauna and flora, including notable species.
- 7.5.433 Due to engineering constraints there is uncertainty about the construction methods that would be used to cross the Blackwater Valley. The possible options comprise trenchless methods and open trench construction. If trenchless construction techniques were implemented at this location, there would be no above ground construction works within this site (TC020), and thus no pathway to potential effects in relation to habitat loss/gain, fragmentation or modification within the Blackwater Valley.
- 7.5.434 If open trench construction were required, then there would be a potential temporary loss of approximately 0.32ha of Reedbed Priority Habitat and 1.4ha of Wet Woodland Priority Habitat within the Order Limits (see Figure A7.1.128 in Appendix 7.1 Habitats and Botany Factual Report).
- 7.5.435 The reedbed habitat within the Order Limits at this location would be excavated and allowed to regenerate once the pipe had been laid. Common reed (*Phragmites australis*) reproduces readily by rhizomes and seed and spreads naturally to wet areas and to water up to 1m deep, with the rhizomes able to grow laterally at a rate of around 1.5m per year (Sussex Wildlife Trust, 2013). *Phragmites* and *Typha* species readily reproduces by seed. Given this recolonising ability, the reedbed habitat is expected to reinstate naturally in the short term. As such, this temporary loss of reedbed habitat would be of negligible magnitude and minor adverse significance.
- 7.5.436 The temporary wet woodland habitat loss would comprise secondary grey willow (*Salix cinerea*) which has encroached into the reedbed. Although there could be some possible ecological benefits of this wet woodland and scrub encroachment removal to the reedbed habitat and associated species, the loss of the tree and scrub habitat is assessed using the precautionary principle and is of small magnitude and minor adverse significance.

Surrey: Surrey Heath Borough Council

i) Frith Hill SNCI and Frimley Fuel Allotments SNCI (Section E)

- 7.5.437 Frith Hill SNCI and Frimley Fuel Allotments SNCI have been designated for their potential for restoration to lowland dry heath habitats. Where the Order Limits cross these sites, they comprise conifer plantation habitat. Detailed botanical survey of

this location identified additional small areas of acid grassland and dry dwarf shrub-heath where there are gaps in the tree canopy, outside of the Order Limits.

- 7.5.438 Conifer plantation is a habitat of limited biodiversity value and the potential loss would be extremely small in comparison to the size of the overall site and retained conifer plantation habitat (see Table 7.25). Nevertheless, narrow working techniques would be adopted at Frith Hill to reduce impacts on mature trees, potential bat roost features and an historic embankment. The approximate distance would be 2.2km (grid ref: SU89055 58008 to SU90944 58779) (NW20 on Figure 7.5).
- 7.5.439 Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).
- 7.5.440 In addition, the excavation works would be in the verge of Frith Hill Road with much of the construction traffic and plant movement confined to the road, further reducing the extent of potential habitat loss.
- 7.5.441 The potential temporary habitat loss at Frith Hill SNCI and Frimley Fuel Allotments SNCI is of negligible magnitude and of negligible significance.

Surrey: Runnymede District Council

- 7.5.442 Within Runnymede District, the Order Limits encompass part of Monk's Walk North and West (incl. M3 Exchange Land) SNCI, Pannells Farm SNCI, Chertsey Bourne at Chertsey Meads SNCI, Chertsey Meads SNCI and River Thames to Runnymede SNCI. These are each discussed, below.
- i) Monk's Walk North and West (incl. M3 Exchange Land) SNCI (Section F)*
- 7.5.443 This SNCI, designated for its wet woodland, heath and wetland, is located immediately east of Chobham Common SSSI/NNR. Habitats within the Order Limits at this location comprises Lowland Mixed Deciduous Woodland Priority Habitat (see Figure A7.1.164 in Appendix 7.1 Habitats and Botany Factual Report).
- 7.5.444 Following the trenchless construction techniques proposed to reduce potential impacts in Chobham Common SSSI/NNR (TC026), it is necessary for the drill to return to the surface in the Monk's Walk North and West (incl. M3 Exchange Land) SNCI.
- 7.5.445 Approximately 2.08ha of broadleaved semi-natural woodland habitat is located within the Order Limits. Approximately 1.07ha of this would be unaffected by construction activity and would be retained and protected as an area for bat mitigation, as required.
- 7.5.446 The potential loss of this habitat would be reduced through working width reduction to 15m to reduce impacts on large pine trees and trees with potential bat roost



features. The approximate distance would be 190m (grid ref: SU99035 64666 to SU99139 64823) (NW25) (Figure 7.5). To further reduce the potential impact, the Order Limits have been aligned to encompass an existing track approximately 4m wide. Approximately 0.24ha of broadleaved semi-natural woodland would be impacted.

- 7.5.447 In addition, the contractor(s) would consider and apply, where practicable, 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)). This would be applied to trees within the Order Limits which would be preserved through the construction phase, and to trees outside of the Order Limits where such measures do not hinder or prevent the use of the relevant working width for construction (G95).
- 7.5.448 Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).
- 7.5.449 Soils containing the seedbank of woodland ground flora would be retained and reinstated post-construction in accordance with the good practice measures set out in the REAC (e.g. G150, G155).
- 7.5.450 Where woodland habitats required removal, appropriate techniques would be used for the removal, storage and translocation of any vegetation which is to be reused, relocated or transplanted (G89). 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). 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 (G97). This would avoid a net loss of woodland habitat and to maintain habitat connectivity in the medium to long term.
- 7.5.451 Considering the embedded and good practice measures proposed, the potential effect is of small magnitude and of minor adverse significance.
- ii) Pannells Farm SNCI (Section G)*
- 7.5.452 The alignment of the Order Limits has been designed to avoid much of Pannells Farm SNCI (see Chapter 4 Design Evolution).
- 7.5.453 The site is designated for its wet grassland and pond habitats. These would in the main be avoided (see Figure A7.1.177 and A7.1.178 in Appendix 7.1 Habitats and Botany Factual Report). However, there would be temporary loss of a very small area of marshy grassland (0.01ha) and Wet Woodland Priority Habitat (0.22ha) on the site's eastern boundary (see Table 7.25).
- 7.5.454 As described previously, good practice measures with respect to soil management and reinstatement would be implemented (e.g. G150, G155). These measures are

set out in the REAC in Chapter 16 Environmental Management and Mitigation, and would reduce impacts to soils and surface vegetation.

7.5.455 Due to the extremely small areas of habitat potentially affected, the potential impact is of small magnitude and minor adverse significance.

iii) Chertsey Bourne at Chertsey Meads SNCI (Section G)

7.5.456 Chertsey Bourne is a main river to the south of Chertsey Meads. Trenchless construction techniques comprising the subsurface drilling of the pipeline would be implemented at this location (TC033). There would be no above ground construction works within this site.

7.5.457 As such, no pathway to potential effects in relation to habitat loss/gain, fragmentation or modification is anticipated for Chertsey Bourne at Chertsey Meads SNCI resulting in an impact of negligible magnitude and negligible significance.

iv) Chertsey Meads SNCI (Section G)

7.5.458 Chertsey Meads is an open area of remnant floodplain meadow on the banks of the River Thames, managed by Runnymede District Council as a public open space and for nature conservation. Part of the SNCI is also an LNR and was formerly a SSSI. The Priority Habitat Inventory describes most of the site as Lowland Meadows Priority Habitat. The site also supports nationally scarce and rare, locally scarce and red-listed species, SSSI selection criteria for vascular plant assemblages (JNCC, n.d.). The biodiversity value of Chertsey Meads is therefore high (see Appendix 7.1 Habitats and Botany Factual Report).

7.5.459 The Order Limits extend for approximately 6.3ha within Chertsey Meads LNR and comprises improved and poor-semi-improved grassland, semi-improved and unimproved neutral grassland and broadleaved semi-natural woodland (Figure 7.3).

7.5.460 The pipeline across Chertsey Meads would be constructed largely by open cut. However, the working width would be reduced to 15m positioned towards the western half of the Order Limits (to reduce impacts to Lowland Meadows Priority Habitat) and ground protection matting would be used over an approximate distance of 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 (NW29) (Figure 7.5). This would reduce the habitat potentially impacted to 3.82ha comprising approximately:

- 0.32ha semi-natural broadleaved woodland;
- 0.06ha of unimproved neutral grassland;
- 0.37ha of semi-improved neutral grassland;
- 0.02ha of swamp; and
- 3.1ha of common and widespread, non-Priority Habitat.

7.5.461 The trenchless crossing of the River Thames would be launched from the northern part of the site (TC034). Broadleaved semi-natural woodland would not be directly



impacted by construction works due to the adoption of trenchless methods at this location (Figure 7.2).

- 7.5.462 The position of the Order Limits has been aligned based on consultation responses from Runnymede Borough Council. Therefore, the Order Limits avoids Lowland Meadows Priority Habitat to the immediate west. However, Lowland Meadows Priority Habitat would be affected by the launch location for the trenchless crossing of the River Thames (TC034) and by open cut. Pipeline stringing areas to the southeast requires no groundworks and therefore is unlikely to adversely impact this habitat (see Figure A7.1.185 in Appendix 7.1 Habitats and Botany Factual Report).
- 7.5.463 Where approximately 0.66ha (not accounting for narrow width working) of Lowland Meadows Priority habitat is located within the Order Limits, south of the River Thames, turf would be stripped, stored and reinstated above the trench between approximate grid references TQ 05958 66596 to TQ 05997 66480 (NW29, see Figure 7.5).
- 7.5.464 In addition, the contractor(s) would produce a Soil Management Plan. In developing the plan, the contractor would take note of the principles within the guidance "Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Department for Environment, Food and Rural Affairs, 2009)", and "Good Practice Guide for Handling Soils (Ministry of Agriculture, Fisheries and Food, 2000)". The Soil Management Plan would include, but not be limited to (G150):
- specification of maximum storage periods, angles and heights of soil stockpiles;
 - reference to published soil types;
 - specification for where a soils watching brief may be required;
 - controls on use of construction machinery in areas where soils have not been stripped; and
 - specification of the role of the Suitably Experienced Person (SEP).
- 7.5.465 These measures proved to be effective for this Priority Habitat on a similar development project (RSK, 2016).
- 7.5.466 The potential effect on the high value habitats in Chertsey Meads LNR is of small magnitude due to the avoidance of the most sensitive habitats, the small proportion of the entire site impacted and the proposed good practice measures. The effect would be of minor adverse significance.
- v) *River Thames to Runnymede SNCI (Section G)*
- 7.5.467 Trenchless construction techniques comprising the subsurface drilling of the pipeline would be implemented at this location (TC034). There would be no above ground construction works within this site.
- 7.5.468 As such, no pathway to potential effects in relation habitat loss/gain, fragmentation or modification is anticipated for River Thames to Runnymede SNCI resulting in an impact of negligible magnitude and negligible significance.

Surrey: Spelthorne Borough Council

- 7.5.469 Within Spelthorne District the Order Limits encompass part of the River Thames - County boundary to Sunbury (boundary with London Borough of Richmond) SNCI, Land west of Littleton Lane SNCI, Shepperton Quarry SNCI, West of Queen Mary Reservoir SNCI and Princes Lake SNCI. These are each discussed, below.
- i) River Thames - County boundary to Sunbury (boundary with London Borough of Richmond) SNCI (Section G)*
- 7.5.470 Trenchless construction techniques comprising the subsurface drilling of the pipeline would be implemented at this location (TC034). There would be no above-ground construction works within this site.
- 7.5.471 As such, no pathway to potential effects in relation to habitat loss/gain, fragmentation or modification is anticipated for River Thames – County boundary to Sunbury (boundary with London Borough of Richmond) SNCI resulting in an impact of negligible magnitude and negligible significance.
- ii) Land west of Littleton Lane SNCI and Shepperton Quarry SNCI (Sections G and H)*
- 7.5.472 Land west of Littleton Lane SNCI and Shepperton Quarry SNCI are generally highly disturbed locations of limited habitat interest and comprises mainly bare earth, due to recent and on-going excavation/quarrying works, with occasional scattered scrub (see Figure 7.4). Designated for their bird interest, no key habitat supporting bird assemblages would be removed during the open cut excavation works.
- 7.5.473 Potential habitat loss within Land west of Littleton Lane SNCI is of negligible magnitude and minor adverse significance.
- iii) West of Queen Mary Reservoir SNCI (Section H)*
- 7.5.474 Designated for its bird assemblage, West of Queen Mary Reservoir SNCI is, generally, a highly disturbed location of limited habitat interest and comprise mainly bare earth, due to recent and on-going excavation/quarrying works, with occasional scattered scrub (see Figure 7.4).
- 7.5.475 Minor encroachment of approximately 0.22ha into this site on its southern boundary would be required to launch and receive the trenchless construction technique equipment used to cross the intake channel for the reservoir (TC037). This area of the SNCI where the Order Limits cross comprise a cleared area and a line of mature broadleaved trees. Otherwise, the Order Limits are limited to the carriageway of the adjacent Ashford Road.
- 7.5.476 No temporary loss of habitats important in supporting bird assemblages would be lost. The contractor(s) would consider and apply, where practicable, 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)). This would be applied to trees within the Order Limits which would be preserved through the construction phase, and to trees outside of



the Order Limits where such measures do not hinder or prevent the use of the relevant working width for construction (G95).

- 7.5.477 Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).
- 7.5.478 Potential habitat loss within West of Queen Mary Reservoir Road SNCI is of negligible magnitude and negligible significance.
- iv) Princes Lake SNCI (Section H)*
- 7.5.479 Trenchless construction techniques comprising the subsurface drilling of the pipeline would be implemented at this location (TC041). There would be no above-ground construction works within this site.
- 7.5.480 As such, no pathway to potential effects in relation to habitat loss/gain, fragmentation or modification is anticipated for Princes Lake SNCI with no habitat impact on the bird assemblage for which the site is designated resulting in a potential impact of negligible magnitude and negligible significance.



Table 7.24: Potential Temporary Habitat Impacts Within Non-statutory Designated Sites in Hampshire

Non-statutory Designated Site	Approximate Area of Site (ha)	Approximate Area Within Order Limits (ha)	Approximate Area Temporarily Impacted (ha) and Proportion of Site Total (%)	Habitat Temporarily Impacted
Eastleigh District Council				
Maddoxford Farm Meadows SINC	2.41	0.14ha	0 (0%)	N/A
Winchester City Council				
Brockwood Copse and Roadside Strips SINC	19.71	0.05	0 (0%)	• Broadleaved semi-natural woodland
East Hampshire District				
Water Lane SINC	2.04	0.03	0 (0%)	• Broadleaved semi-natural woodland
Hart District Council				
Ewshot Meadows SINC	6.89	1.45	0.45 (7%)	• Semi improved grassland • Broadleaved semi-natural woodland
Meadow Near Soanes Copse SINC	2.5	0.01	0 (0%)	N/A
Wakefords Copse, Crondall SINC	5.8	0.99	0.5 (9%)	• Broadleaved semi-natural woodland
Rushmoor Borough Council				
Pyestock Hill/Pondtail Heath SINC	64.79	0.30	0 (0%)	N/A
Pyestock (North Grasslands) SINC	5.06	4.03	0 (0%)	N/A
South of Ively Road SINC	0.57	0.12	0 (0%)	N/A
Cove Brook Grassland SINC	5.6	0.33	0.33 (6%)	• Broadleaved semi-natural woodland • Scattered scrub • Improved grassland
Cove Valley, Southern Grassland SINC	3.94	1.20	0.6 (15%)	• Broadleaved semi-natural woodland • Wet Woodland • Improved grassland
Blackwater Valley, Frimley Bridge SINC	11.96	0.27	If trenchless - 0 (0%)	N/A



Non-statutory Designated Site	Approximate Area of Site (ha)	Approximate Area Within Order Limits (ha)	Approximate Area Temporarily Impacted (ha) and Proportion of Site Total (%)	Habitat Temporarily Impacted
			If open cut – 0.7 (2.3%)	<ul style="list-style-type: none"> • Broadleaved semi-natural woodland • Dry acid dwarf shrub heath • Scattered scrub

Table 7.25: Potential Temporary Habitat Impact Within Non-statutory Designated Sites in Surrey

Non-statutory Designated Site	Approximate Area of Site (ha)	Approximate Area Within Order Limits (ha)	Approximate Area Temporarily Impacted (ha) and % of Site Total	Habitat Temporarily Impacted
Surrey Heath Borough Council				
Frimley Hatches (including Frimley Reedbeds) SNCI	48.18	1.77	If trenchless - 0 (0%) If open cut – 1.77 (0.04%)	<ul style="list-style-type: none"> • Wet woodland • Reedbed
Frith Hill SNCI	108.21	4.97	2.6 (2%)	<ul style="list-style-type: none"> • Conifer plantation • Broadleaved semi-natural woodland
Frimley Fuel Allotments SNCI	37.96	0.11	0.5 (1%)	<ul style="list-style-type: none"> • Conifer plantation
Runnymede Borough Council				
Monk's Walk North and West (incl. M3 Exchange Land) SNCI	11.38	2.06	0.24 (2%)	<ul style="list-style-type: none"> • Broadleaved semi-natural woodland
Pannells Farm SNCI	11.67	0.70	0.23 (2%)	<ul style="list-style-type: none"> • Improved grassland • Poor semi-improved grassland • Marshy grassland • Broadleaved semi-natural woodland
Chertsey Bourne at Chertsey Meads SNCI	5.04	0.12	0 (0%)	N/A



Non-statutory Designated Site	Approximate Area of Site (ha)	Approximate Area Within Order Limits (ha)	Approximate Area Temporarily Impacted (ha) and % of Site Total	Habitat Temporarily Impacted
Chertsey Meads SSCI	71.38	6.30	3.82 (5%)	<ul style="list-style-type: none"> • Neutral grasslands • Improved grassland
River Thames to Runnymede SSCI	55.9	0.16	0 (0%)	N/A
Spelthorne Borough Council				
River Thames - County boundary to Sunbury (boundary with London Borough of Richmond) SSCI	66.74	0.11	0 (0%)	N/A
Shepperton Quarry SSCI	48.94	1.58	1.0 (2%)	<ul style="list-style-type: none"> • Bare earth • Scattered trees
Land west of Littleton Lane SSCI	39.77	1.58	1.0 (2.5%)	<ul style="list-style-type: none"> • Bare earth • Scattered trees
West of Queen Mary Reservoir SSCI	36.45	0.23	0.23 (0.6%)	<ul style="list-style-type: none"> • Bare earth • Scattered trees
Princes Lake SSCI	43.81	0.09	0 (0%)	N/A



Introduction/Spread of INNS

- 7.5.481 Terrestrial and aquatic INNS are known to be present within non-statutory designated sites that intersect with the Order Limits and across the wider area (Appendix 7.4 Invasive Non-Native Plant Species Factual Report). Any further introduction or spread of INNS would potentially cause significant adverse effects to sensitive habitats in non-statutory designated sites identified in Table 7.15 due to the dominance that INNS can have over native species. These sites are located within 7m of the Order Limits, the accepted distance at which Japanese knotweed rhizomes can spread. It is reasonable to assume that rhizomes of other INNS would not extend beyond this precautionary distance and that the risk of INNS introduction/spread beyond 7m from the Order Limits is negligible. Areas of potential risk from INNS within the Order Limits are detailed in Appendix 7.4 Invasive Non-Native Plant Species Factual Report.
- 7.5.482 During construction works, there is potential for INNS to be introduced or spread via contaminated machinery or soil. There is also a risk of transferral from pedestrian movement and worker vehicles. Working within watercourses would also be required, with the potential to cause introduction or spread of INNS within the aquatic environment.
- 7.5.483 However, it is considered that the potential spread of INNS would be adequately controlled through good practice measures set out in the REAC. A suitable methodology would be produced to set out how identifiable areas with the potential presence of Schedule 9 plant species or other invasive species would be demarcated, and how any affected soils would be appropriately managed throughout the works (G42). Furthermore, pre-construction surveys would be completed if existing baseline survey data need to be updated or supplemented (G33); topsoils and subsoils intended for reinstatement would be temporarily stockpiled as close to where they were stripped from as practicable (G155); and a SWMP would be developed prior to construction. The contractor(s) would maintain and monitor the SWMP throughout the construction period and oversee that any sub-contractor(s) adhere to the SWMP (G77).
- 7.5.484 Given the above measures, the potential impact of introduction/spread of INNS is of negligible magnitude and negligible significance.

Species Disturbance

Hampshire: Hart District

- i. Skains Copse/Combe Wood/Turners Copse SINC (Section D), Woodlands A, B & D Meadows SINC (Section D) and Beacon Hill/Parkhurst Hill SINC (Section D)*
- 7.5.485 Dormice are cited as interest features of three SINC's within 1km of the Order Limits: Skains Copse/Combe Wood/Turners Copse SINC is located immediately adjacent the Order Limits; Woodlands A, B & D Meadows SINC are located approximately 80m away; and Beacon Hill/Parkhurst Hill SINC is approximately 240m away.



7.5.486 A species-specific assessment with respect to dormice is provided elsewhere within this chapter and so is not repeated here.

Surrey

i. Chobham Place Woods SNCI (Section F), Little Heath SNCI (Section F), Simplemarsh Farm SNCI (Section G) and Sheep Walk Lake SNCI (Section H)

7.5.487 Breeding birds are specifically noted in the citations for four non-statutory designated sites within 1km of the Order Limits (listed south to north along the Order Limits):

- Chobham Place Woods SNCI (410m north of Order Limits);
- Little Heath SNCI (920m south of Order Limits);
- Simplemarsh Farm SNCI (30m south of the Order Limits); and
- Sheep Walk Lake SNCI (355m east of the Order Limits).

7.5.488 None are located within the Order Limits.

7.5.489 The pathways by which disturbance effects could occur to bird species within these designated sites include noise, vibration and visual disturbance. Disturbance of breeding birds could adversely affect the survival, range and abundance of certain species, although susceptibility to disturbance does vary between species, from total avoidance through to rapid habituation (e.g. see Cutts *et al.*, 2009; Latimer *et al.*, 2003). However, disturbance of breeding birds present at over 300m (i.e. distance of three of four sites) from the Order Limits is highly unlikely.

7.5.490 Simplemarsh Farm SNCI is located 30m from the Order Limits. However, at this point the Order Limits comprise an access track entry point from the A317, opposite the SNCI. The Simplemarsh Farm SNCI is separated from the Order Limits by the A317 to the north. Both verges of the A317 comprise broadleaved woodland or mature scrub. As such, the Order Limits would be completely screened from the SNCI and so visual disturbance is extremely unlikely to arise.

7.5.491 Furthermore, the SNCI is immediately adjacent to the M25 and A317, both of which generate high volumes of traffic noise. The project is considered sufficiently distant from the SNCI and project activities sufficiently minor (i.e. the Order Limits at this location would be used for an access and there would be no major disturbance events, such as rock blasting or other controlled explosions, piling) that noise disturbance is unlikely to have any effect on bird species within the site.

7.5.492 The magnitude of disturbance change to breeding birds of the identified non-statutory designated sites is negligible and of negligible significance.

ii. Frimley Hatches (including Frimley Reedbeds) SNCI (Section E), Land West of Littleton Lane SNCI (Section G and H), Shepperton Quarry SNCI (Section



H), Sheep Walk Lake SNCI (Section H), West of Queen Mary Reservoir SNCI (Section H) and Queen Mary Reservoir SNCI (Section H)

- 7.5.493 Wintering birds are specifically noted in the citations for six non-statutory designated sites within 1km of the Order Limits:
- Frimley Hatches (including Frimley Reedbeds) SNCI, Land west of Littleton Lane SNCI, Shepperton Quarry SNCI and West of Queen Mary Reservoir SNCI located within the Order Limits;
 - Sheep Walk Lake SNCI (355m east of the Order Limits); and
 - Queen Mary Reservoir SNCI (310m east of the Order Limits).
- 7.5.494 If Frimley Hatches (including Frimley Reedbeds) SNCI is crossed using trenchless construction techniques (TC020), there would be no disturbance pathway to effect. However, if open cut construction were chosen in this location the Order Limits would bisect the site and disturbance would likely occur during construction works. Any effect of disturbance would be temporary and experienced in the short term during the construction period only. Given the large size of the site (approximately 48ha), it is anticipated that birds within the zone of influence would be displaced to undisturbed locations elsewhere within the SNCI.
- 7.5.495 If vegetation removal is required at Frimley Hatches (including Frimley Reedbeds) SNCI, there is an assumption 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 (G35).
- 7.5.496 Works during the breeding season would be preceded by breeding bird surveys if the proposed activities were likely to result in offences under the Wildlife and Countryside Act 1981 (as amended). In the event that breeding birds listed on Schedule 1 of the Act were present, the contractor(s) would comply with relevant protected species legislation and appropriate licences obtained where necessary from Natural England (G43).
- 7.5.497 Regardless of the timing of works, potential impacts of noise would be reduced through the use of good practice measures, as set out in the REAC. 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 (G98).
- 7.5.498 If necessary, temporary acoustic barriers or enclosures would be installed to reduce noise levels at sensitive receptors especially in locations where noisy plant would be used for a prolonged period of time (G107).



- 7.5.499 Based on the above, if open trench excavation is required at Frimley Hatches (including Frimley Reedbeds) SNCI, any effect of disturbance would be small in magnitude and of low adverse significance.
- 7.5.500 Land West of Littleton Lane SNCI and Shepperton Quarry SNCI are overlapping sites with the same designation. Where the Order Limits pass through these sites, a gravel extraction operation is in process. The open water habitats used by wintering birds are screened from the Order Limits by mature continuous scrub and trees. There are existing noise and visual disturbance pressures to these lakes, including disturbance from the M3 motorway, recreation and industry. Given this context, it is likely that birds using these waterbodies during the winter are habituated to the existing levels of disturbance. Moreover, as there are many waterbodies in the surrounding southwest London area, there is sufficient habitat for birds to move to during peak disturbance events (including undisturbed locations of the same water body).
- 7.5.501 As discussed previously, the Order Limits pass near to Queen Mary Reservoir SNCI and West of Queen Mary Reservoir SNCI. At this location, the Order Limits are restricted to Ashford Road, and all construction activity would be limited to the carriageway and verge. The waterbodies associated with West of Queen Mary Reservoir SINC are screened from the Order Limits by mature broadleaved woodland. The reservoir itself is screened by its 12m high embankment (Engineering-Timelines, 2008) and the dense scrub and woodland around the lakes to the west (Google Earth, 2018). The surrounding area is also highly disturbed, with an active gravel works, roads and residential areas. Sheep Walk Lake SNCI is located over 300m to the east, separated from the project by Littleton Lane, mature broadleaved woodland and Littleton Lake.
- 7.5.502 Given the small scale of the construction works required for the project and existing levels of disturbance, the embankment and woody habitats are considered likely to provide effective screens to any additional noise or visual stimuli arising from the project that could affect wintering birds on the reservoir or lakes.
- 7.5.503 Given the above, any effect of disturbance would be negligible in magnitude and of negligible significance at Land West of Littleton Lane SNCI, Shepperton Quarry SNCI (Section H), Sheep Walk Lake SNCI (Section H), West of Queen Mary Reservoir SNCI (Section H) and Queen Mary Reservoir SNCI.
- iii. Field between Hook and Priest Lane SNCI (Section F)*
- 7.5.504 Although brown trout are noted in the citation for Field between Hook and Priest Lane SNCI, this site is located over 900m from the Order Limits and there is no hydrological connection between this stream and the Order Limits. As such, there is no pathway to disturbance effect to fish at this SNCI.
- iv. River Thames - County boundary to Sunbury (boundary with London Borough of Richmond) SNCI (Section G)*
- 7.5.505 This site is notable for fish and otter. Disturbance effects could be caused by noise, an increased human presence near to watercourses used by the species, and



lighting resulting in avoidance behaviours, expenditure of additional energy which may be difficult to replace, potentially reducing condition or reproductive success.

- 7.5.506 No otter holts or lay-up sites have been identified within 200m of the River Thames crossing point. This location is also subject to regular recreational use, including by dog walkers thus reducing the site's suitability for resting, sheltering or breeding otter. It is therefore considered highly unlikely that disturbance to resting, sheltering or breeding otter would arise.
- 7.5.507 There is a low risk of disturbance to foraging otter as this species is highly mobile and occupies very large ranges. As such, any otter present within the watercourse during potentially disturbing construction activities would be able to disperse unimpeded into unaffected parts of the watercourse nearby.
- 7.5.508 Potential disturbance impacts on citation listed fish species of the River Thames - County boundary to Sunbury (boundary with London Borough of Richmond) SNCI (eel, salmon and sea trout) could include noise (vibration) and artificial lighting during earthworks as part of construction activities. Although the River would be crossed using trenchless construction techniques (TC034), likely sources of disturbance would remain and comprise noise and vibrations during earthworks and lighting disturbance from temporary lit construction areas.
- 7.5.509 Noise (vibration) emissions during construction have the potential to create a deterrent to fish species, preventing or delaying migrating of species through watercourses and the creation of avoidance behaviours in resident species. During the construction phase of the project, works such as: earthworks; vehicle movements; drilling; excavation; and piling activities, carried out in the vicinity of the River Thames could generate ground-borne vibrations that may propagate into the watercourse. Depending on the frequency, content and levels of noise, this may have the potential to affect sensitive species and at various life stages.
- 7.5.510 Lighting has the potential to disrupt migration of sensitive species as well as affect the behaviour of resident species. Territorial species are likely to leave the area adjacent to the works to find new territories, resulting in increased competition elsewhere.
- 7.5.511 Appropriate buffer zones would be established within Order Limits adjacent to identified watercourses (G39). 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). This would be implemented to reduce potential disturbance effects on otter and fish species.
- 7.5.512 The implementation of previously described good practice measures would further limit any potential disturbance impact on otter and fish species of the River Thames - County boundary to Sunbury (boundary with London Borough of Richmond) SNCI resulting in a negligible magnitude and negligible significance.

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

7.5.513 Habitats that are dependent on groundwater levels, flows or quality have been identified within nine non-statutory designated sites, as described in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment:

- Botley Golf Course SINC and Maddoxford Farm Meadows SINC – wet woodland and marshy grassland of high to moderate to low water dependency (Figure A8.3.1 in Appendix 8.3);
- Peck Copse SINC – wet woodland of high groundwater dependency supplied by chalk groundwaters;
- Ewshot Meadows SINC – marshy grassland and wet woodland of moderate to low to moderate groundwater sensitivity (Figure A8.3.14 in Appendix 8.3);
- Cove Brook Grassland SINC and Cove Valley Southern Grassland SINC – wet woodland of low to moderate groundwater dependency (Figure A8.3.21 in Appendix 8.3);
- Blackwater Valley, Frimley Bridge SINC and Frimley Hatches (including Frimley Reedbeds) SNCI – wet woodland and reedbed habitat of moderate to low groundwater dependency (Figure A8.3.23 in Appendix 8.3); and
- Chertsey Meads LNR/SNCI – unimproved grassland, wet woodland and swamp habitats of low groundwater dependency (Figure A8.3.37 in Appendix 8.3);
- Pannells Farm SNCI – marshy grassland and wet woodland of moderate to low groundwater dependency (Figure A8.3.35 in Appendix 8.3).

Changes to Groundwater Levels or Flows Caused by Temporary Dewatering

i) Botley Golf Course SINC and Maddoxford Farm Meadows SINC

7.5.514 The Order Limits would cross the valley of the Ford Lake Stream with a trenchless crossing (TC001). The trenchless crossing is anticipated to be housed within the London Clay Formation under most of the Maddoxford Farm Meadows SINC (see Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment). The trenchless crossing would not likely require any dewatering except at the launch and reception sites which would require excavations to a depth equivalent to a trench. However, these excavations would be located outside the SINC.

7.5.515 The contractor(s) would ensure that the time the trench is open in the vicinity of certain features would only be as long as necessary for the installation of the pipeline. The required dewatering of the trench would be undertaken only as and when necessary to enable safe working and preparation for pipe installation (G132).

7.5.516 The potential impact of dewatering on the wet woodland and marshy grassland GWDTE of the SINC of Ford Valley is of negligible magnitude and negligible significance.

ii) Peck Copse SINC

7.5.517 In areas where installation would be by open cut and the depth of the trench would intersect the water table, dewatering would be required for the duration of



construction. Dewatering could lower groundwater levels and change groundwater flows on which wet woodland GWDTE are dependent, resulting in potential effects to GWDTE habitats leading to loss, fragmentation or modification.

7.5.518 The Order Limits approximately 30m west of Peck Copse SINC are likely to be above the groundwater table at most times, but groundwater levels in the local Chalk geology are expected to fluctuate significantly seasonally (see Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment). Given that the springs at Peck Copse SINC are located down gradient of the Order Limits, flows to the SINC may be temporarily reduced. However, these flows are not likely to affect the integrity of the site as the main groundwater flows, originating from deeper within the Chalk, would be expected to remain unaffected.

7.5.519 The potential effect due to dewatering on the wet woodland GWDTE of Peck Copse is of negligible magnitude and negligible significance.

iii) Ewshot Meadows SINC

7.5.520 In areas where installation would be by open cut and the depth of the trench would intersect the water table, dewatering would be required for the duration of installation. Dewatering could lower groundwater levels and change groundwater flows on which GWDTE are dependent, leading to potential effects to GWDTE habitats resulting in loss, fragmentation or modification. The depth of the water table would depend on the season during which installation works take place.

7.5.521 Within Ewshot Meadows SINC, the Order Limits pass near to GWDTE of moderate groundwater dependency (see Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment). Based on available information it is not known whether the pipeline trench within the site would intercept the water table but given the low-lying situation of the SINC, this is likely to be the case during wetter periods. It is likely that dewatering during construction would be required. However, this potential effect would be temporary, for the duration of works within the site, and would be localised.

7.5.522 As previously described, good practice measures G132 and G134 would be implemented to reduce any potential effects of dewatering, as set out in the REAC.

7.5.523 Dewatering would be unlikely to result in a change in groundwater dependent vegetation such that it would no longer form part of the nature importance of the SINC.

7.5.524 In conclusion, based on the small area potentially affected and transient nature of the potential effect, it is of negligible magnitude and minor adverse significance.

iv) Cove Brook Grassland SINC and Cove Valley Southern Grassland SINC

7.5.525 Dewatering may be required of any excavated trench. However, any dewatering is likely to have only a localised effect on groundwater levels. There are small patches of potentially groundwater dependent habitat in proximity to the Order Limits, although most of the habitat is beyond the expected influence of dewatering (see Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment).



- 7.5.526 The contractor(s) would ensure that the time the trench is open in the vicinity of certain features, would only be as long as necessary for the installation of the pipeline. The required dewatering of the trench would be undertaken only as and when necessary to enable safe working and preparation for pipe installation (G132).
- 7.5.527 Any potential effect would be temporary, for the duration of works within the site, and would be localised. Moreover, the grassland habitats within the site are of low groundwater dependency and in poor condition, comprising few species and species which have broad ecological tolerances (see Appendix 7.1 Habitats and Botany Factual Report). Given this, the potential effect on grassland GWDTE of Cove Brook Grassland SINC and Cove Valley Southern Grassland SINC due to dewatering during construction is of negligible magnitude and negligible significance.
- v) *Blackwater Valley, Frimley Bridge SINC and Frimley Hatches (including Frimley Reedbeds) SNCI*
- 7.5.528 The crossing method at this location is undecided. If the pipeline were constructed by open cut across the site, then dewatering would be required. Dewatering could also be required at the launch and reception shafts if the pipeline were constructed using a trenchless method (TC020). Dewatering could have a radius of influence of approximately 200m, potentially affecting a large area of Frimley Hatches (including Frimley Reedbeds) SNCI (Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment).
- 7.5.529 However, the contractor(s) would ensure that the time the trench is open in the vicinity of certain features, would only be as long as necessary for the installation of the pipeline. The required dewatering of the trench would be undertaken only as and when necessary to enable safe working and preparation for pipe installation (G132). Reedbed habitat, which is abundant within and adjacent to the Order Limits, is tolerant of a wide range of water levels (Wheeler *et al.*, 2004) so that a temporary lowering of the water table due to dewatering is unlikely to lead to habitat loss, fragmentation or modification.
- 7.5.530 Of the wet woodland habitats present, wet woodland of grey willow within the former gravel pits are likely to be the most affected by dewatering due to their extent and proximity to the Order Limits. This habitat is of low groundwater dependency and can be found in a variety of contexts (Rodwell, 1991), mostly as secondary woodland developed over unmanaged damp ground. A temporary lowering of the water table due to dewatering is unlikely to lead to loss, fragmentation or modification of this wet woodland habitat
- 7.5.531 Wet woodland dominated by alder is more distant from the Order Limits, in drier areas around the former gravel pits. Given their location, a temporary lowering of the water table due to dewatering is unlikely to lead to habitat loss, fragmentation or modification.
- 7.5.532 In addition, temporary stanks would be installed within the trench prior to undertaking dewatering/draining activities, to prevent migration of water within the trench (G134).



7.5.533 In summary, at the Blackwater Valley site, the potential effect of habitat loss, fragmentation or modification due to dewatering during construction would be of negligible magnitude and negligible significance.

vi) Chertsey Meads LNR/SNCI

7.5.534 Construction within Chertsey Meads would be largely by open cut, with further excavations associated with the reception and launch pits of the proposed trenchless crossings of the River Bourne (TC033) and River Thames (TC034). In excavations where the depth of the trench would intersect the water table, dewatering would be required for the duration of construction. Dewatering could lower groundwater levels and change groundwater flows on which GWDTE are dependent, leading to potential effects to GWDTE habitats resulting in loss, fragmentation or modification. The depth to the water table would depend on the season during which works take place but based on the available hydrogeological information excavations are likely to be below the water table (Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment).

7.5.535 The habitats of Chertsey Meads closest to the Order Limits are mostly not groundwater dependent. However, there are some small areas of grassland of low groundwater dependency within the area expected to be affected by dewatering (Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment). Any potential effect would be temporary, for the duration of works within the site, and would be localised.

7.5.536 In conclusion, the potential effect is of negligible magnitude and negligible significance.

vii) Pannells Farm SNCI

7.5.537 It is likely that the trench required for installation of the pipeline would fall below the water table in the far eastern part of the site (Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment). Therefore, dewatering may be required.

7.5.538 However, any dewatering would likely have only a localised effect on groundwater levels and would be temporary, for the duration of works within the site. The contractor(s) would ensure that the time the trench is open in the vicinity of certain features, would only be as long as necessary for the installation of the pipeline. The required dewatering of the trench would be undertaken only as and when necessary to enable safe working and preparation for pipe installation (G132). In addition, temporary stanks would be installed within the trench prior to undertaking dewatering/draining activities, to prevent migration of water within the trench (G134).

7.5.539 Given this, and that the habitat potentially impacted is of moderate to low groundwater dependence and thus less sensitive to changes in groundwater levels and flows, the potential effect due to dewatering on Pannells Farm SNCI is of negligible magnitude and negligible significance.



Changes to Groundwater Quality from Chemical or Pollutant Leaks and Spills

- 7.5.540 In the unlikely event of chemical or pollutant leaks or spills during construction there is a risk to groundwater quality upon which GWDTE are dependent. This could lead to potential effects to GWDTE habitats resulting in their loss, fragmentation or modification.
- 7.5.541 Good practice pollution prevention measures set out in the REAC would be implemented to reduce the risk of potential effects, and secured through DCO requirements such as the CoCP. Measures would include:
- appropriate storage and handling of fuels and other substances hazardous to the environment (G8);
 - potentially hazardous materials used during construction would be safely and securely stored including use of secondary containment where appropriate (G119);
 - 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 (G121);
 - fuels, oils and chemicals would be stored responsibly, away from sensitive water receptors. They would be stored >15m from watercourses, ponds and GWDTE (G142); and
 - 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 (G117).
- 7.5.542 Based on the above, the potential effects of changes to groundwater quality from chemical or pollutant leaks and spills on the GWDTE of the nine sensitive non-statutory designated sites would be of negligible magnitude and negligible significance.

Hydrological Change – Surface Water Contamination

- 7.5.543 Hydrological links between the Order Limits and a number of watercourses which are components of non-statutory designated sites have been identified.
- 7.5.544 In Hampshire sites of relevance are: Maddoxford Farm Meadows SINC; Peck Copse SINC; Water Lane SINC; Quarry Bottom SINC; Ewshot Wood SINC; Skains Copse/Combe Wood/Turners Copse SINC; Ewshot Meadows SINC; Soanes Copse/Wood Copse SINC; Beacon Hill/Parkhurst Hill SINC; Pyestock Hill/Pondtail Heath SINC; Cove Brook Grassland SINC; Cove Valley, Southern Grassland SINC; Blackwater Valley, Frimley Bridge SINC.
- 7.5.545 In Surrey, these sites are: Frimley Hatches (including Frimley Reedbeds) SNCI; Frith Hill SNCI; The Folly SNCI; Pannells Farm SNCI; Chertsey Bourne at Chertsey Meads SNCI; River Thames to Runnymede SNCI; River Thames - County boundary



to Sunbury (boundary with London Borough of Richmond) SNCI; Land west of Littleton Lane SNCI; and Land west of Queen Mary Reservoir, Ashford Road SNCI.

7.5.546 The risk of pollution events occurring during construction are considered to be extremely low due to the previously described embedded and good practice measures set out in the REAC.

7.5.547 For open cut watercourse crossings and installation of vehicle crossing points, measures would include to (G122):

- 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.

7.5.548 In addition,

- 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 (G11);
- 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) (G12);
- appropriate buffer zones would be established within Order Limits adjacent to identified watercourses (G39);
- potentially hazardous materials used during construction would be safely and securely stored including use of secondary containment where appropriate (G119);
- 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 (G121); and



- fuels, oils and chemicals would be stored responsibly, away from sensitive water receptors. They would be stored >15m from watercourses, ponds and GWDTE (G142).

7.5.549 Considering the good practice measures that would be implemented, potential effects of surface water contamination on non-statutory designated sites are highly unlikely and therefore of negligible magnitude and negligible significance.

Air Quality Changes – Dust Deposition

7.5.550 Air quality changes could occur through fugitive dust caused by construction plant activities. Retained terrestrial and freshwater habitat receptors within non-statutory designated sites, up to 50m from the Order Limits (39 SINCs and 22 SNCIs, see Table 7.15), may be affected through changes in air quality as the vegetation present may theoretically experience reduced photosynthesis, respiration and transpiration caused by smothering from dust.

7.5.551 As pipelaying would be typically undertaken at a rate of approximately 450m per week in rural areas and 90m per week in urban areas, main construction activities and any subsequent dust deposition would only be within the zone of influence (i.e. 50m) of sensitive non-statutory designated sites for limited periods, typically less than two weeks. However, construction haul routes could be used for a longer period of time and could act as a source of dust.

7.5.552 It is considered that there are no potentially dust generating activities proposed as part of the project that could not be managed using normal good practices to prevent significant effects at non-statutory designated sites.

7.5.553 As previously described, a dust management plan would be produced as set out in the REAC (G30).

7.5.554 Appendix 13.2 Air Quality Technical Note shows that, taking into account the good practice measures, there are no potentially significant effects in relation to air quality and there is no requirement for mitigation.

7.5.555 Based on this, the potential magnitude of change with respect to dust deposition is small and of minor significance.

Table 7.26: Summary of Potential Impacts on Biodiversity - All Non-statutory Designated Sites

Potential Impact	Value	Magnitude	Significance
Chertsey Meads SNCI/LNR			
Habitat loss/gain, fragmentation or modification	High	Small	Negligible
Air quality changes – dust deposition	High	Small	Minor
GWDTE – Changes to groundwater levels or flows caused by temporary dewatering	High	Negligible	Minor
GWDTE – Changes to groundwater quality from chemical or pollutant leaks or spills	High	Negligible	Negligible
Introduction/spread of INNS	High	Negligible	Negligible
Water Lane SINC			
Habitat loss/gain, fragmentation or modification	High	Negligible	Minor

Potential Impact	Value	Magnitude	Significance
Air quality changes – dust deposition	High	Small	Minor
Introduction/spread of INNS	High	Negligible	Negligible
Brockwood Copse and Roadside Strips SINC			
Habitat loss/gain, fragmentation or modification	High	Small	Minor
Air quality changes – dust deposition	High	Small	Minor
Introduction/spread of INNS	High	Negligible	Negligible
All other non-statutory designated sites (worst case scenario)			
Habitat loss/gain, fragmentation or modification	Medium	Small	Minor
GWDTE - Changes to groundwater levels or flows caused by temporary dewatering	Medium	Negligible	Minor
GWDTE – Changes to groundwater quality from chemical or pollutant leaks or spills	Medium	Negligible	Negligible
Hydrological change – surface water contamination	Medium	Negligible	Negligible
Air quality changes – dust deposition	Medium	Small	Minor
Introduction/spread of INNS	Medium	Negligible	Negligible
Species disturbance	Medium	Small	Minor

Ancient Woodland

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.556 The Order Limits have been aligned to avoid all AWI sites (O2). No vegetation clearance or groundworks within these sites is proposed. As such, there is no potential pathway to effects caused by habitat loss/fragmentation.
- 7.5.557 Some construction works would be required with 15m of AWI sites, potentially encroaching into root zones of trees within those sites. This potential impact is addressed in Chapter 10 Landscape and Visual.
- 7.5.558 Potential Ancient Woodland Sites (less than 2ha) were identified by a desk study (see Appendix 7.3 Ancient Woodland Factual Report and Figure 7.3). As there is uncertainty whether these locations represent true Ancient Woodland, a precautionary approach has been adopted and the Order Limits have been designed to avoid these sites, where practicable. However, the Order Limits intersects with Potential Ancient Woodland Sites Under 2ha at several locations: AW2, AW4a, AW7, AW12, AW15a, AW30, and AW41.
- 7.5.559 The following Potential Ancient Woodland Sites (less than 2ha) would be avoided through the use of trenchless construction techniques: AW2 (TC001), AW7 (TC003), and AW30 (TC028). For trenchless crossings TC001, TC003 and TC028, vegetation would be retained except where emergency access is required to trenchless equipment or ecological works have been proposed (G174).
- 7.5.560 A proposed access road also passes through AW7. Access to a site compound to the south of the Riversdown Road would be achieved through two existing farmer's access points off this road. One of the access points passes through AW7 (which is also designated as Brockwood Copse and Roadside Strips SINC). However, this access point has been aligned to make use of an existing farmer's gate and so a



new gap in the woodland and hedgerow at this location would not be required. Nearby trees within the Order Limits would be protected as per the provisions of good practice measures set out in the REAC (e.g. G65, G95).

- 7.5.561 AW4a, although within the Order Limits, would not be affected by any construction activity. The Order Limits have been positioned at this location as a mitigation site for bats and would only be used for the placement of bat boxes, if required (G56). Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).
- 7.5.562 At AW12, the Limits of Deviation (the area within which the pipeline would be installed) have been narrowed to align with an existing farmer's access point between two arable fields. As such, trench excavation would not require vegetation removal. The soils at this location are likely to have been degraded due to the regular movement of agricultural machinery through the access point at this location. Furthermore, treed areas within the Order Limits would not be affected by construction activity as these are set aside for bat mitigation and would only be used for the placement of bat boxes, if required (G56). These trees would be protected through good practice measures described previously (e.g. G40, G65, G95).
- 7.5.563 AW15a (Section D) is a linear woodland feature linked to Ewshot Wood SINC which is designated for its Ancient Woodland habitat. This linear feature was surveyed (see Appendix 7.1 Habitats and Botany Factual Report) and 12 Ancient Woodland indicator species were identified. In addition, the Ancient Woodland desk study (see Appendix 7.3 Ancient Woodland Factual Report) identified additional supporting characteristics confirming its likely Ancient Woodland status. A 5m gap is located where AW15a meets the adjacent woodland, where an existing ditch has been culverted. The pipeline and access route would be positioned over this gap and subject to reduced width working (NW33) over an approximate distance of 10m. A hazel shrub would be reduced to ground level and ground protection would be used over the culvert, stream and hazel root. As this area would have been previously excavated to install the culvert, it is not expected that sensitive ancient soils would be affected.
- 7.5.564 AW41 is also designated as Water Lane SINC. As previously described, the Order Limits intersect the SINC at an existing farmer's access track at which location there are several wide gaps in the tree line. Pipeline installation at this location would therefore not require the creation of a new gap. At this location, the SINC is devoid of sensitive woodland or ground flora interest and potential impacts on the SINC and the Ancient Woodland habitat would be avoided. It is not expected that valuable soils associated with Ancient Woodland would be present within the Order Limits at this location. This is due to regular ground disturbance caused by agricultural machinery using this access point. Good practice measures G40, G65, G95 and G150 would be applied at this location, as set out in the REAC.



- 7.5.565 Given the above, potential effects of habitat loss/gain, fragmentation or modification to AW2, AW4a, AW7, AW12, AW15a, AW30, and AW41 are considered negligible in magnitude and negligible in significance.

Introduction/Spread of INNS

- 7.5.566 Desk study and field surveys have identified INNS of terrestrial and riparian habitats within AWI sites and Potential Ancient Woodland Sites (less than 2ha) in area (see Appendix 7.1 Habitats and Botany Factual Report and 7.4 INNS Factual Report). INNS known to be present within AWI sites comprise: butterfly bush; cherry laurel; Himalayan balsam; Japanese knotweed; rhododendron; variegated yellow archangel; and Wilson's honeysuckle. Variegated yellow archangel was recorded in the Potential Ancient Woodland Site (less than 2ha), AW7 in the Order Limits.
- 7.5.567 Any further introduction or spread of INNS could cause significant adverse effects to Ancient Woodland habitats due to the dominance that INNS can have over native species.
- 7.5.568 Although no construction works within AWI sites is proposed, there is the theoretical potential for INNS to be introduced or spread via contaminated run off originating from the Order Limits. Where works would take place within or immediately adjacent to the Potential Ancient Woodland Sites (less than 2ha), there is potential for INNS to be introduced through contaminated soil, equipment or machinery.
- 7.5.569 However, it is considered that the potential spread of INNS would be adequately controlled through the good practice measures set out in the REAC: Pre-construction surveys would be completed if existing baseline survey data need to be updated or supplemented (G33); topsoils and subsoils intended for reinstatement would be temporarily stockpiled as close to where they were stripped from as practicable (G155); and a suitable methodology would be produced to set out how identifiable areas with the potential presence of Schedule 9 plant species or other invasive species would be demarcated, and how any affected soils would be appropriately managed throughout the works (G42).
- 7.5.570 Due to implementation of good practice measures, the potential impact of establishment/spread of INNS is of negligible magnitude and negligible significance.

Air Quality Changes – Dust Deposition

- 7.5.571 Air quality changes caused by fugitive dust generated during construction could result in impacts to Ancient Woodland habitats within 50m of the Order Limits. Smothering by dust may cause reduced photosynthesis, respiration and transpiration of woodland vegetation, resulting in habitat degradation.
- 7.5.572 Fifteen blocks of Ancient Woodland (approximately 109.7ha in total), are located within 50m of the Order Limits. Twenty-eight Potential Ancient Woodland Sites (less than 2ha) (totalling approximately 13ha) are also located within 50m of the Order Limits. There is approximately 25,000ha of Ancient Woodland in Hampshire (Hampshire Biodiversity Partnership, 2000) and approximately 12,000ha in Surrey (Davies *et al.*, 2011) and so the areas within 50m of the Order Limits constitutes

less than 0.005% of the total Ancient Woodland resource in Surrey and in Hampshire.

- 7.5.573 As pipelaying would be typically undertaken at a rate of approximately 450m per week in rural areas and 90m per week in urban areas, main construction activities and any subsequent dust deposition would only be within the zone of influence (i.e. 50m) of Ancient Woodland habitats for a limited time.
- 7.5.574 It is considered that there are no potential dust generating activities proposed as part of the project that could not be managed using normal good practice measures.
- 7.5.575 A dust management plan would be produced, with relevant measures implemented as necessary (G30). The adoption of good practice dust measures to manage the generation of emissions at source are set out in the REAC.
- 7.5.576 Appendix 13.2 Air Quality Technical Note shows that, taking into account the good practice measures, there are no potentially significant effects in relation to air quality and there is no requirement for mitigation.
- 7.5.577 Considering the good practice measures and relative area of Ancient Woodland habitat potentially impacted, the potential impact of air quality change in terms of dust deposition on Ancient Woodland habitats is of small magnitude and minor adverse significance.

Table 7.27: Summary of Potential Impacts on Biodiversity (Without Mitigation) - Ancient Woodland

Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Ancient Woodland Inventory site	Habitat loss/gain, fragmentation or modification	High	Potential Impact Avoided	
	Air quality changes – dust deposition	High	Small	Minor
	Introduction/spread of INNS	High	Negligible	Negligible
Potential Ancient Woodland Sites (less than 2ha)	Habitat loss/gain, fragmentation or modification	High	Negligible	Negligible
	Air quality changes – dust deposition	High	Small	Minor
	Introduction/spread of INNS	High	Negligible	Negligible

Priority Habitats

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.578 The Order Limits intersect with the following Priority Habitats: Coastal and Floodplain Grazing Marsh; Hedgerows; Lowland Dry Acid Grassland; Lowland Heathland; Lowland Meadows; Lowland Mixed Deciduous Woodland; Purple Moor-grass and Rush Pastures; Reedbeds; and Wet Woodland. These locations are shown on figure 7.3 and in finer detail within relevant figures in Appendix 7.1 Habitats and Botany Factual Report where they are present within designated sites.
- 7.5.579 The approximate areas of Priority Habitats within the Order Limits are presented in Table 7.28. Where detailed botanical survey identified Priority Habitat within the Priority Habitat Inventory, the area (ha) used is taken from the botanical survey.

7.5.580 Vegetation clearance and ground works would result in the temporary loss of Priority Habitats where they are present in the Order Limits.

Table 7.28: Priority Habitats Identified Within the Order Limits

Priority Habitat (Outside of Designated Sites)	Approximate Area Within Order Limits	Approximate Area Temporarily Impacted
Coastal and Floodplain Grazing Marsh	3.5ha	2.45ha
Hedgerows	8,100m	2,500m
Lowland Dry Acid Grassland	2.68ha	1.70ha
Lowland fen	0.11ha	0ha
Lowland Heathland	9.47ha	1.57ha
Lowland Meadows	0.91ha	0.46ha
Lowland Mixed Deciduous Woodland	28.62ha	9.55ha
Purple Moor-grass and Rush Pastures	1.29ha	0.74ha
Reedbeds	0.32ha	Dependent on construction technique at Blackwater Valley – either 0.32ha or 0ha
Wet Woodland	5.07ha	1.16ha

Coastal and Floodplain Grazing Marsh

- 7.5.581 Coastal and Floodplain Grazing Marsh at Ford Lake Stream (Section A) would be avoided due to embedded design in the form of trenchless construction techniques to install the pipeline (TC001).
- 7.5.582 The implementation of trenchless construction (TC008) would reduce impacts to an area of Coastal and Floodplain Grazing Marsh Priority Habitat near to the existing Esso Pumping Station at Alton (Section C), south of the River Wey. However, botanical survey (see Appendix 7.1 Habitats and Botany Factual Report) of this site concluded that the grassland areas were improved and of low biodiversity value.
- 7.5.583 Coastal and Floodplain Grazing Marsh Priority Habitat elsewhere within the Order Limits at Wintershill (Section A), Caker Stream (Section C) and the valley of the Cove Brook (Section E), totalling approximately 2.45ha, would be temporarily impacted by construction activities. However, botanical survey (see Appendix 7.1 Habitats and Botany Factual Report) concluded that the grassland habitats at these locations were in poor condition predominantly comprising poor semi-improved or improved grassland.
- 7.5.584 During construction, topsoils and subsoils intended for reinstatement would be temporarily stockpiled as close to where they were stripped from as practicable (G155). The contractor would also produce a Soil Management Plan, as outlined previously (G150).
- 7.5.585 Post-construction, land used temporarily would be reinstated to an appropriate condition relevant to its previous use (G94) (i.e. grazing) and 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).

- 7.5.586 Due to the embedded and good practice measures described, in combination with the low biodiversity value of the habitats affected, the magnitude of change on coastal floodplain and grazing marsh is small and of minor significance.

Hedgerows

- 7.5.587 Over 270 boundary crossings were assessed by a combination of desk study and field survey. Approximately 250 of varying age, structure and connectivity, would be crossed by the Order Limits. Not all of these are captured by the Hedgerows Regulations 1997 but of those that are, 146 have been identified as *important* and 21 as *likely important* (where survey constraints existed) in relation to the Hedgerows Regulations 1997.

- 7.5.588 There is a commitment to only utilise a 10m width when crossing through boundaries between fields where these include hedgerows, trees or watercourses (O1). 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). 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 (G97).

- 7.5.589 There is a high degree of confidence in the successful reinstatement of hedgerow habitat in the medium to long term and no permanent loss of hedgerow habitat is anticipated.

- 7.5.590 Due to the extremely localised and reversible nature of hedgerow removal, the potential effect is of small magnitude and minor adverse significance.

Lowland Dry Acid Grassland

- 7.5.591 Approximately 2.68ha of Lowland Dry Acid Grassland Priority Habitat was recorded within the Order Limits at six locations across Sections D to F, in Surrey (Figure 7.3). Direct impact on these habitats would arise during the installation process.

- 7.5.592 No Lowland Dry Acid Grassland Priority Habitat was identified within the Order Limits in Hampshire or Greater London.

- 7.5.593 Narrow width working at would reduce the area of Lowland Dry Acid Grassland to 1.7ha. To protect soils during construction and to assist with reinstatement, topsoils and subsoils intended for reinstatement would be temporarily stockpiled as close to where they were stripped from as practicable (G155). The contractor would also produce a Soil Management Plan, as outlined previously (G150).

- 7.5.594 Post installation, 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).

- 7.5.595 Given the above and that there is approximately 151ha of Lowland Dry Acid Grassland in Surrey (Surrey Nature Partnership, 2017), the potential impact of



habitat loss/gain, fragmentation or modification of Lowland Dry Acid Grassland is of small magnitude and minor adverse significance.

Lowland Fens

- 7.5.596 Approximately 0.11ha of Lowland Fen Priority Habitat was recorded in the Order Limits at Chobham Common SSSI/NNR. An assessment of impacts to this habitat is provided above in the section discussing Chobham Common SSSI and the Annex I habitats 'Northern Atlantic wet heaths with *Erica tetralix*' and 'Depressions on peat substrates of the *Rhynchosporion*'. Further information with respect to Annex I habitat at Chobham Common SSSI is provided in the project's HRA Report.
- 7.5.597 Outwith statutory designated sites, no areas supporting Lowland Fen Priority Habitat has been recorded and where it has been recorded within designated sites it has been avoided by narrow width working NW23 and NW 24, see Figure 7.5.
- 7.5.598 Given the above, the potential impact is of negligible magnitude and negligible significance.

Lowland Heathland

- 7.5.599 The majority of the 9.47ha of Lowland Heathland Priority Habitat recorded within the Order Limits is located within three SSSI: Bourley and Long Valley SSSI, Colony Bog and Bagshot Heath SSSI and Chobham Common SSSI. Impacts to habitats at these sites is described in the relevant sections above.
- 7.5.600 Outwith statutory designated sites, Lowland Heathland Priority Habitat has been recorded within the Order Limits at the following locations: Old Ively Road (Section E) and Blackwater Valley (Section E) (Figure 7.3).
- 7.5.601 At Old Ively Road, the Priority Habitat Inventory (Natural England, 2018) shows an area of Lowland Heathland Priority Habitat. However, botanical survey at this location confirmed that Lowland Heathland is no longer present, with the verge comprising Lowland Mixed Deciduous Woodland (also Priority Habitat) and common gorse (*Ulex europaeus*) scrub, with a small area of Lowland Dry Acid Grassland Priority Habitat which has developed over relict patches of heathland (see Appendix 7.1 Habitats and Botany Factual Report). Vegetation removal is likely to be avoided at this location as pipelaying would be within the carriageway, as indicated by the narrow width working shown on Figure 7.5 (NW15). No impacts to Lowland Heathland Priority Habitat would arise at this location.
- 7.5.602 At Blackwater Valley, 0.08ha of Lowland Heathland Priority Habitat was recorded within the Order Limits between the railway line and A331 road (see Appendix 7.1 Habitats and Botany Factual Report). The pipeline installation methodology at this location has yet to be confirmed. If a trenchless technique is adopted (TC020), there would be no impact to this habitat as all works would be underground. If open cut is required, temporary habitat loss would be likely within the Order Limits.
- 7.5.603 During above-ground construction works at Blackwater Valley, topsoils and subsoils intended for reinstatement would be temporarily stockpiled as close to where they were stripped from as practicable (G155). The contractor would also produce a Soil



Management Plan, as outlined previously (G150). Vegetation clearance, retention, protection and replanting/reinstatement drawings would be produced prior to the construction phase. The contractor(s) would implement these plans including agreed mitigation where practicable (G87).

- 7.5.604 Heathland within non-statutory designated wildlife sites (i.e. Blackwater Valley, Frimley Bridge SINC) would be reinstated using natural regeneration, unless otherwise agreed (HRA1). This approach is consistent with standard conservation measures for the restoration and management of heathland and there is a high degree of confidence that that disturbed habitats would reinstate to pioneer heathland or acid grassland in the short to medium term (Gimingham, 1992). No long-term impacts are anticipated after restoration and regrowth of vegetation.
- 7.5.605 In conclusion, taking account of the embedded design and good practice detailed above, and the small areas of habitats within the Order Limits impacted (approximately 1.57ha) relative to that in the wider landscape (there are over 4,000ha of heathland habitats in Surrey, Surrey Nature Partnership, 2017) and over 10,000ha in Hampshire (Hampshire Biodiversity Partnership, 2008), the potential impact is of negligible magnitude and minor adverse significance.

Lowland Meadows

- 7.5.606 Approximately 0.91ha of Lowland Meadow Priority Habitat was identified within the Order Limits at four locations across the project: adjacent to Stephen's Castle Down (East) SINC (Section A); Betty Mundy's Bottom (Section A); Old Ively Road (Section D); and Chertsey Meads (Section G) (see Figure 7.4).
- 7.5.607 At Stephen's Castle Down, 0.08ha of Lowland Meadow Priority Habitat was recorded within the Order Limits adjacent to the SINC (Figure A7.1.33 in Appendix 7.1 Habitats and Botany Factual Report). The area of this habitat within the Order Limits comprises less species-rich grassland than areas to the south, including an area used as a track. This area would be impacted by construction activity.
- 7.5.608 At Betty Mundy's Bottom, 0.01ha of semi-improved neutral grassland constituting Lowland Meadows Priority Habitat was recorded. This grassland was in poor condition due to abundant weed species. This habitat is therefore of low biodiversity value (Appendix 7.1 Habitats and Botany Factual Report). Less than 0.01ha of Lowland Meadows are positioned within the Limits of Deviation, which are 20m wide (minimum) at this location. This leaves sufficient space to install the pipeline and accommodate all other construction activities without directly impacting Lowland Meadows habitat. The Priority Habitat would then be protected through good practice measure G40 as set out in the REAC: Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. Suitable methodologies would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature.
- 7.5.609 At Old Ively Road, 0.15ha of Lowland Meadows Priority Habitat was recorded, often supporting diverse species assemblages of medium biodiversity value (see Appendix 7.1 Habitats and Botany Factual Report). Construction works at this



location would be subject to narrow width working (NW15) and would be restricted to the carriageway. Nearby areas of Lowland Meadow Priority Habitat would be protected through the use of buffer zones as set out in G40 in the REAC, where practicable.

- 7.5.610 At Chertsey Meads, 0.66ha of Lowland Meadow Priority Habitat was recorded within the Order Limits. This potential impact is assessed in the non-statutory designed site section and not repeated here.
- 7.5.611 At all locations where groundworks are required during construction, topsoils and subsoils intended for reinstatement would be temporarily stockpiled as close to where they were stripped from as practicable (G155). The contractor would also produce a Soil Management Plan, as outlined previously (G150). Vegetation clearance, retention, protection and replanting/reinstatement drawings would be produced prior to the construction phase. The contractor(s) would implement these plans including agreed mitigation where practicable (G87). Where possible reinstatement of vegetation would be on a like for like basis whilst having regards to the restrictions of pipeline easements (G88). It is therefore predicted that Lowland Meadows at all affected areas would recover in the short term (i.e. Within five years) following completion of the construction phase.
- 7.5.612 Given the reduced area of Lowland Meadows impacted (approximately 0.46ha) and the above good practice measures, the potential impact is of a small magnitude and minor adverse significance.

Lowland Mixed Deciduous Woodland

- 7.5.613 Impacts to notable trees is assessed in detail in Chapter 10 Landscape and Visual.
- 7.5.614 The Order Limits intersect with approximately 42 locations of Lowland Mixed Deciduous Woodland Priority Habitat totalling approximately 28.62ha, with individual plots ranging between 2.15ha and 0.04ha in area. These habitats were identified in Hampshire and Surrey, in all Sections (Figure 7.3).
- 7.5.615 There are approximately 48,475ha of native woodland (which includes Lowland Mixed Deciduous Woodland Priority Habitat) in Hampshire (Hampshire Biodiversity Partnership, 2008) and 36,100ha of woodland Priority Habitat types in Surrey (Surrey Nature Partnership, 2017).
- 7.5.616 Figure 7.5 shows where trenchless construction techniques would avoid the removal of Lowland Mixed Deciduous Woodland identified within the Order Limits. Figure 7.5 also illustrates the locations of narrow width working. It is a commitment set out in the REAC to only utilise a 10m width when crossing through boundaries between fields where these include hedgerows, trees or watercourses (O1). Where notable trees would be retained within or immediately adjacent to the Order Limits, the trees and their root protection areas would be protected where they extend within the Order Limits and are at risk. This would be by means of fencing or other measures (G65). Specific locations to reduce potential impact on Lowland Mixed Deciduous Woodland Priority Habitat comprise those at (see Figure 7.5):



- Farringdon (Section B) – NW3 - 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);
- North of Foyle (Section C) – NW4 and NW5 – Working width reduced to 15m to reduce impacts on woodland and landscape within two areas with a combined approximate distance of 100m. (Grid ref: SU7849 946112 to SU78530 46153 and SU78548 46176 to SU78578 46217);
- Dippenhall Road (Section C) – NW6 - Working width reduced to 15m to reduce impacts on Priority Habitat woodland with bat roost potential over an approximate distance of 83m (Grid ref: SU78771 46476 to SU78833 46529); and
- Oak Park Golf Course, Crondall (Section D) – NW7 - 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).

7.5.617 Retained trees would also be protected as per the provisions of good practice measures set out in the REAC (e.g. G65, G95).

7.5.618 These project commitments would reduce potential Lowland Mixed Deciduous Woodland Priority Habitat to approximately 9.55ha. Additional reductions may also be possible during the detailed routing design.

7.5.619 Where direct impact on woodland priority habitats would arise, vegetation clearance, retention, protection and replanting/reinstatement drawings would be produced prior to the construction phase. The contractor(s) would implement these plans including agreed mitigation where practicable (G87).

7.5.620 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) using appropriate techniques for the removal, storage and transplantation of any vegetation which is to be reused, relocated or transplanted (G89). 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 (G97). This would avoid a net loss of habitat and to maintain connectivity in the medium to long term. Habitat reinstatement is predicted in the medium to long term.

7.5.621 Soils containing the seedbank of woodland ground flora would be retained and reinstated post-construction through the implementation of previously described good practice measures (e.g. G148, G150, G151), resulting in a similar ground flora to that temporarily affected by construction. Reinstatement of soils and ground flora is predicted in the short term.

7.5.622 In addition, tree planting is proposed at six locations: one in Section A; four in Section B; and one in Section D (see Figure 7.5).

7.5.623 The botanical survey (see Appendix 7.1 Habitats and Botany Factual Report) of Wakefords Copse, the largest area of Lowland Mixed Deciduous Woodland impacted, identified a comparatively richer ground flora on the wayleave of the



existing Esso pipeline. This existing pipeline was installed in the 1970s. This suggests that the reinstatement method employed then, and the similarly proposed reinstatement of soils and natural regeneration for this project, could result in relatively improved ground flora diversity and distribution than that of the retained woodland site.

- 7.5.624 Approximately 9.56ha of Lowland Mixed Deciduous Woodland Priority Habitat could be temporarily lost, subject to the detailed design. This is approximately 0.01% of the combined woodland coverage in Hampshire and Surrey.
- 7.5.625 Given the above, the potential impact is of small magnitude and minor adverse significance.

Purple Moor-grass and Rush Pastures

- 7.5.626 Four areas of Purple Moor-grass and Rush Pastures Priority Habitat were recorded in the Order Limits, totalling approximately 1.29ha (Figure 7.3). Of this, the approximate 0.74ha at Bourley and Long Valley SSSI would be avoided with the implementation of trenchless construction techniques (TC011) and 0.19ha at Colony Bog and Bagshot Heath SSSI would be avoided with the implementation of narrow width working (see Figure 7.5).
- 7.5.627 At Durley Mill in Hampshire (Section A) impacts to 0.74ha of this Priority Habitat would be avoided or reduced through a combination of reduced width working (NW1, see Figure 7.5), ground protection matting and turf stripping, as per good practice measure NW1: 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: SU5224616257 to SU5231416384). Turf would be stripped, stored and reinstated above the trench for an approximate distance of 35m between approximate grid references SU 52306 16340 to SU 52329 16365.
- 7.5.628 At Ewshot Meadows SINC in Hampshire (Section D), impacts to 0.1ha of this habitat would be avoided or reduced through reduced-width working (NW8), detailed in the non-statutory designated sites section of this chapter.
- 7.5.629 Good practice soil handling and reinstatement measures would also be implemented, as previously described.
- 7.5.630 Approximately 190ha of Purple Moor-grass and Rush Pastures have been recorded across Hampshire (Hampshire Biodiversity Partnership, 2008). The <0.75ha of this Priority Habitat that would be temporarily impacted comprises less than 0.003% of the county's resource.
- 7.5.631 Considering the good practice measures, the temporary, reversible and small area of impact, the potential magnitude of change is small and a minor adverse effect is predicted on Purple Moor-grass and Rush Pastures Priority Habitat.



Reedbeds

- 7.5.632 The single location where Reedbed Priority Habitat was recorded in the Order Limits is located within the Blackwater Valley, Frimley Bridge SINC and Frimley Hatches (including Frimley Reedbeds) SNCI (Section E). This reedbed has an area of approximately 0.32ha within the Order Limits.
- 7.5.633 Two options for construction at this location are possible. Open cut trench techniques would require the reedbed habitat within the Order Limits at this location to be excavated. It would be reinstated once the pipe had been laid. Common reed reproduces readily by rhizomes and seed and spreads naturally to wet areas and to water up to 1m deep, with the rhizomes able to grow laterally at a rate of around 1.5m per year (Sussex Wildlife Trust, 2013).
- 7.5.634 *Phragmites* and *Typha* species readily reproduces by seed. Given this strong recolonising ability, the reedbed habitat is expected to reinstate naturally in the short term.
- 7.5.635 In the event that open cut is required, the temporary loss of reedbed habitat would result in a small magnitude of change and a minor adverse effect.
- 7.5.636 The trenchless construction option would avoid reedbed habitat and so no habitat loss or fragmentation impact would occur.

Wet Woodland

- 7.5.637 Approximately 5.07ha of Wet Woodland Priority Habitat has been identified within the Order Limits at 12 locations in both Hampshire and Surrey (Figure 7.3).
- 7.5.638 A total of approximately 2.5ha (49% of Wet Woodland within the Order Limits) would be avoided. Wet Woodland Priority Habitat at Ford Lake Stream (Section A), Bourley and Long Valley SSSI (Section D), Chobham Common SSSI (Section F) and the northern and southern boundary of Chertsey Meads (Section G) would be avoided with implementation of trenchless construction techniques (TC001, TC011/012, TC024, TC026, and TC034 respectively) or reduced-width works (NW12 on Figure 7.5).
- 7.5.639 Impacts to Wet Woodland Priority Habitat would occur at Wintershill (section A); Ewshot Meadows SINC (Section D); Cove Brook Valley (Section E); adjacent the River Halebourne (Section F); and Addlestone Moor (Section G) To reduce impacts at these locations (Figure 7.5), reduced-width working would be implemented. Together these reduce the area of Wet Woodland impacted to approximately 1.42ha.
- 7.5.640 Where direct impact on Wet Woodland Priority Habitats would arise, 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). 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 (G97). Good practice soil handling would see that soils containing the seedbank of woodland ground flora would be retained and reinstated



post-construction. Retained ground flora adjacent to the impacted habitats would also help promote the regeneration of disturbed areas. These good practice measures are set out in the REAC and secured through DCO requirements such as the CoCP. The loss of individual trees is assessed in detail in Chapter 10 Landscape and Visual.

- 7.5.641 Approximately 1.42ha of Wet Woodland Priority Habitat could be temporarily damaged or lost within the Order Limits. As such, the potential effect is of a small magnitude and minor adverse significance.

Introduction/Spread of INNS

- 7.5.642 Botanical surveys identified INNS in Priority Habitats (outside of designated sites) in the study area (Appendix 7.4 Invasive Non-Native Plant Species Factual Report). Any further introduction or spread of INNS in Priority Habitats due to construction activity could potentially cause significant adverse effects to those habitats due to the dominance that INNS can have over native species.
- 7.5.643 It is considered that the potential spread of INNS would be adequately controlled through the good practice measures set out in the REAC. Pre-construction surveys would be completed if existing baseline survey data need to be updated or supplemented (G33); topsoils and subsoils intended for reinstatement would be temporarily stockpiled as close to where they were stripped from as practicable (G155); and a suitable methodology would be produced to set out how identifiable areas with the potential presence of Schedule 9 plant species or other invasive species would be demarcated, and how any affected soils would be appropriately managed throughout the works (G42).
- 7.5.644 With the implementation of the good practice measures, the potential effects of introduction/spread of INNS is considered to be of negligible magnitude and negligible significance.

Air Quality Changes – Dust Deposition

- 7.5.645 Air quality changes caused by fugitive dust generated during construction could result in impacts to Priority Habitat within 50m of the Order Limits. Smothering by dust may cause reduced photosynthesis, respiration and transpiration of vegetation, resulting in habitat degradation. The approximate areas of Priority Habitat (outside of designated sites) within 50m of the Order Limits are shown on figure 7.3.
- 7.5.646 Appendix 13.2 Air Quality Technical Note shows that, taking into account the proposed good practice measures (i.e. G30), there are no potentially significant effects in relation to air quality and there is no requirement for mitigation.
- 7.5.647 With the implementation of the above good practice, the potential impact of air quality change on Priority Habitats is considered to be of small magnitude and minor adverse significance.

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

- 7.5.648 The following Priority Habitats have been recorded within or near to the Order Limits and are potentially sensitive to changes to groundwater levels, flows or quality:
- Coastal and Floodplain Grazing Marsh;
 - Purple Moor-grass and Rush Pastures; and
 - Wet Woodland.
- 7.5.649 Outside of designated sites, Coastal and Floodplain Grazing Marsh Priority Habitat is present at the following GWDTE assessment sites (also see Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment):
- Wintershill (Section A);
 - Caker and Lavant Streams Floodplain (Section C); and
 - Floodplain of River Wey (Section C).
- 7.5.650 All sites supported improved grassland of little intrinsic biodiversity value and are not sensitive to changes in groundwater levels, flows or quality. This potential impact is not discussed further.
- 7.5.651 Outside of designated sites, Purple Moor-grass and Rush Pastures Priority Habitat is present at the following GWDTE assessment sites (see Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment):
- Durley Green Lane (Section A); and
 - Foxhills Golf Course (Section F).
- 7.5.652 This habitat at these locations has been identified as having, respectively, moderate and moderate to low dependence on groundwater levels, flows or quality (Figures A8.3.3 and A8.3.33 in Appendix 8.3).
- 7.5.653 Outside of designated sites, Wet Woodland Priority Habitat is present at the following GWDTE assessment sites (Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment):
- Durley Green Lane (Section A – outside of Order Limits);
 - Wintershill Floodplain (Section A); and
 - Addlestone Moor (Section G).
- 7.5.654 Wet Woodland Priority Habitat at these locations has been identified as having, respectively, moderate and moderate to low dependence on groundwater levels, flows or quality (Figures A8.3.3 and A8.3.33 in Appendix 8.3).

Changes to Groundwater Levels or Flows Caused by Temporary Dewatering

i) Purple Moor-grass and Rush Pastures

- 7.5.655 Within Durley Green Lane (Section A), the pipeline trench would likely intercept the water table in the area supporting Purple Moor-grass and Rush Pastures Priority



Habitat. It is likely that dewatering would be required at this location but would have only a localised effect on groundwater levels of temporary duration. Given this, the potential effect on Purple Moor-grass and Rush Pastures Priority Habitat at this location due to dewatering during construction is negligible magnitude and negligible significance.

7.5.656 Purple Moor-grass and Rush Pastures Priority Habitat at Foxhills Golf Course (Section F) is over 100m south of the Order Limits and the trench into which the pipeline would be installed is likely to be above the water table through this site. No dewatering would likely be required at this location and so no effect is predicted.

ii) Wet Woodland

7.5.657 Within Durley Green Lane (Section A), the pipeline trench is likely to intercept the water table to the south of the site so that dewatering would be required. Any dewatering is likely to have only a localised effect on groundwater levels. As Wet Woodland Priority Habitat at Durley Green Lane is outside of the Order Limits and up-gradient from the Order Limits, the potential effect of dewatering at this location is of negligible magnitude and negligible significance.

7.5.658 Within Wintershill Floodplain (Section A), the pipeline trench is likely to intercept the water table in the southern part of the site so that dewatering would be required. Any dewatering is likely to have only a localised effect on groundwater levels. As Wet Woodland priority habitat at Wintershill Floodplain is within but up-gradient from the Order Limits, the potential effect to Wet Woodland at this site due to dewatering is of negligible magnitude and negligible significance.

Changes to Groundwater Quality from Chemical or Pollutant Leaks and Spills

7.5.659 In the unlikely event of chemical or pollutant leaks or spills during construction there is a risk to groundwater quality of upon which GWDTE Priority Habitats are dependent. This could lead to potential effects to Wet Woodland GWDTE Priority Habitats resulting in their loss, fragmentation or modification.

7.5.660 Based on the above, and the implementation of previously described good practice measures (e.g. G8, G117, G119, G121 and G142), the potential effects of changes to groundwater quality from chemical or pollutant leaks and spills on the GWDTE of Priority Habitats would be of negligible magnitude of negligible significance.

Table 7.29: Summary of Potential Impacts on Biodiversity - Priority Habitats

Potential Impact	Value	Magnitude	Significance
Habitat loss/gain, fragmentation or modification	Medium	Small	Minor
Introduction/spread of INNS	Medium	Negligible	Negligible
Air quality changes – dust deposition	Medium	Small	Minor
Hydrological changes to groundwater dependent terrestrial ecosystems			
i. changes to groundwater levels or flows caused by temporary dewatering	Medium	Negligible	Negligible
ii. changes to groundwater quality from chemical or pollutant leaks or spills	Medium	Negligible	Negligible



Notable Plant Species (Outside of Designated Sites)

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.661 Heathland specialist notable plant species were recorded during botanical survey within the Order Limits (see Appendix 7.1 Habitats and Botany Factual Report). These were often restricted to designated sites but were also found in heathland habitats and Priority Habitats outside of designated sites. Notable heathland specialist plants record outside of designated sites were: heather, bell heather, heath speedwell, tormentil, devil's-bit scabious, and mat-grass. Although notable species, these plants were recorded as locally abundant throughout the survey area.
- 7.5.662 With the exception of devil's-bit scabious, these species readily re-establish from the seed bank and vegetative material, and it can be reasonably assumed that these species would regenerate once the soils had been reinstated in accordance with good practice measures (e.g. G88, G148, G151, HRA1). Although devil's-bit scabious has less ability to do so, the highly localised impact and wider presence of the species outside of the Limits of Deviation would not result in a loss of individual plants that would have an effect on the local population size or distribution.
- 7.5.663 The potential impact of temporary habitat loss on heathland notable plant species, outside of designated sites, is of small magnitude and minor adverse significance.

Table 7.30: Summary of Potential Impacts on Biodiversity - Notable Plant Species

Potential Impact	Value	Magnitude	Significance
Habitat loss/gain, fragmentation or modification	Low	Small	Minor

Aquatic Macroinvertebrates

- 7.5.664 Some macroinvertebrate communities have limited opportunity to move away from impacted areas. Different species have varying sensitivities to potential environmental changes caused by construction activity. No species of conservation interest were identified from the desk or field assessment in the watercourses crossed by the Order Limits, nor any species with a specific sensitivity. However, macroinvertebrates remain susceptible to potential impacts brought about by the project.

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.665 The majority of watercourse crossings are through ephemeral or dry watercourse channels with very limited habitat that would support aquatic macroinvertebrates. These watercourses may only flow for short periods of the year, if at all, and therefore are unlikely to support diverse macroinvertebrate communities. No macroinvertebrates of conservation interest have been reported from these watercourses and there is limited habitat to support sensitive species.
- 7.5.666 Several of the watercourses with high sensitivity for aquatic macroinvertebrates (WCX019; WCX048; WCX051; WCX066 and WCX095 – see Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report) would be crossed by trenchless construction methods, thereby avoiding any direct habitat loss/gain, fragmentation or modification impact (TC008, TC016, TC020, TC022 and TC033 respectively).



- 7.5.667 However, aquatic habitat loss due to open cut crossing of minor watercourses along the pipeline route would arise through in-channel works during the construction phase. Ively Brook (WCX047) has high sensitivity for aquatic macroinvertebrates and would be crossed using open cut trench construction methods. This would also occur on a tributary of the Halebourne (WCX068), a watercourse with moderate sensitivity.
- 7.5.668 For open cut watercourse crossings and installation of vehicle crossing points, the working width would be reduced to 10m whilst still ensuring safe working (G122). All works within or adjacent to watercourses would be carried out in accordance with the requirements of permits and licences agreed with either the Environment Agency or relevant Local Lead Flood Authority or in accordance with the provisions of the DCO (G123).
- 7.5.669 Habitat loss/fragmentation would be temporary. River bank and in-channel vegetation would be retained where not directly affected by installation works (G131). The riparian vegetation and natural bed of the watercourse would be reinstated using the material removed when appropriate on completion of the works and compacted as necessary; if additional material is required, appropriately sized material of similar composition would be used (G122). The contractor(s) would ensure that the time the trench is open in the vicinity of certain features would only be as long as necessary for the installation of the pipeline. The required dewatering of the trench would be undertaken only as and when necessary to enable safe working and preparation for pipe installation (G132).
- 7.5.670 Given the above measures, the potential habitat loss/fragmentation impact on macroinvertebrates is of small magnitude and minor adverse significance.

Mortality and Injury

- 7.5.671 A subsequent effect of temporary habitat loss of aquatic habitats on aquatic macroinvertebrates is the mortality and injury of individuals. However, the reduced working width of 10m at open cut watercourse crossings (G122) and reinstatement of aquatic habitats, macroinvertebrate communities are expected to quickly re-colonise the area to pre-construction conditions once the cofferdam is removed by natural drift dispersal from upstream populations.
- 7.5.672 The potential mortality and injury impact on macroinvertebrates is of negligible magnitude and negligible significance.

Changes in Hydrology

- 7.5.673 During open cut crossings of watercourses there may be temporary changes to water quantity and flow types which in turn may influence aquatic habitats. Aquatic macroinvertebrates are known to demonstrate fidelity to specific flow regimes and changes may result in modification of the macroinvertebrate community. However, reduction of working widths to 10m at watercourse crossings (G122), the temporary nature of the impact and reinstatement of pre-construction works flows would see that the potential changes in hydrology impact on macroinvertebrates is of negligible magnitude and negligible significance.

Changes in Hydrology – Surface Water Contamination

- 7.5.674 Changes in water quality, brought about by construction activities in or adjacent watercourses may introduce elevated levels of sediment or pollutants into the watercourse. Sediments may smother macroinvertebrates potentially leading to mortality and habitat modification. This in turn may result in shifts in macroinvertebrate communities. Pollutants, such as organics, nutrients, metals, hydrocarbons and salts may affect sensitive species, changing macroinvertebrate communities to populations tolerant of polluted conditions.
- 7.5.675 However, the risk of pollution events occurring during construction is considered to be extremely low based on the implementation of previously described good practice measures (G8, G11, G12, G39, G119, G121, G122 and G142).
- 7.5.676 As such, the potential impact of water quality change on macroinvertebrates is considered unlikely and therefore negligible in magnitude and negligible in significance.

Table 7.31: Summary of Potential Impacts on Biodiversity - Aquatic Macroinvertebrates

Potential Impact	Value	Magnitude	Significance
Mortality and injury	Low	Negligible	Negligible
Habitat loss/gain, fragmentation or modification	Low	Small	Minor
Hydrological change during open cut crossing of watercourses	Low	Negligible	Negligible
Hydrological change – surface water contamination	Low	Negligible	Negligible

Bats

Mortality and Injury

- 7.5.677 Bats could potentially be killed or injured as a result of tree felling or demolition of garage structures, if roosts are present. Appendix 7.7 Bat Factual Report and specifically Figure A7.7.2 show the location of trees and garages with bat roosting potential, plus the three confirmed bat roosts from 2018 field surveys, within 10m of the Order Limits.
- 7.5.678 Where possible, the alignment of the Order Limits and Limits of Deviation have been selected to reduce the loss of trees with bat roost potential and maintain maximum distance between construction areas and retained trees. Chapter 4 Design Evolution lists approximately ten locations where this occurred.
- 7.5.679 Impacts to trees and the potential risk of mortality and injury of bats would be avoided or reduced through embedded and good practice measures set out in the REAC. Examples of relevant good practice measures include:
- when crossing through boundaries between fields where these include hedgerows, trees or watercourses, the working width would be reduced to 10m wide to reduce habitat loss (O1); and
 - Buildings, structures and trees within the Order Limits, confirmed to have high or moderate potential to support bats, that do not require removal, would be retained and protected with an appropriate buffer zone. Those that require



removal and have high or moderate potential for bat roosts would be surveyed prior to their removal and either removed, or removed under licence from Natural England if roosts are confirmed to be present (G174).

- 7.5.680 Should evidence of roosting bats be recorded, and if the tree or garages cannot be retained (e.g. by careful aligning of the pipeline route within the Limits of Deviation or moving construction work areas elsewhere within the Order Limits), good practice measures would be required as set out in the REAC. Appendix 7.17 Protected and Controlled Species Legislation Compliance Report further considers the specific requirements on the project of EU and national protected species legislation (e.g. appropriate timing of works, soft-felling). The contractor would comply with relevant protected species legislation with regards to bats. Appropriate licences would be obtained where necessary from NE for all works affecting protected species as identified through pre-construction surveys. All applicable works would be undertaken in accordance with the relevant mitigation requirements and conditions set out in those licences (G43).
- 7.5.681 The implementation of good practice measures would see that the potential impact is of negligible magnitude and negligible significance as a result of mortality and injury.

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.682 Bat roost presence and a desk study on bat activity is presented in Appendix 7.7 Bat Factual Report. Habitats suitable for roosting bats within the Order Limits comprise trees and garage structures. The Order Limits cross rural areas in Hampshire and southern Surrey where bat activity would be most prevalent with a close association with mature broadleaved woodland, waterbodies, and parkland, as well as the hedgerows and other linear habitat features that interconnect these habitats. Bats use a broad range of habitats for commuting and foraging activities depending on the species feeding preferences, ability and strength of flight and roosting preferences for commuting and foraging purposes. 'Hotspots' for bat activity are detailed in the baseline and Appendix 7.7 Bat Factual Report.
- 7.5.683 The potential loss of habitats used by bats could cause a reduction in the availability of suitable roosting habitat/features or loss and/or fragmentation of foraging and/or commuting habitat for bats. However, for potential effects to be significant, they would need to be detrimental to the maintenance of the population of the species at a favourable conservation status, as per Regulation 55(9)(b) of the Conservation of Habitats and Species Regulations 2017.
- 7.5.684 The habitat index assessment in Appendix 7.7 Bat Factual Report and illustrated on figure A7.7.1 shows the value of habitat within the Order Limits based on historic bat data, habitat suitable for bats and species rarity (Wray, 2010) which are considered more vulnerable to habitat loss or fragmentation. This habitat index pinpoints areas where temporary habitat loss has an increased chance of affecting bats.



Roosts

- 7.5.685 The Order Limits have been aligned to avoid the most sensitive trees or woodland blocks that support or have the potential to support bats. A number of areas within the Order Limits would also undergo narrow width working to reduce impacts on woodland and trees with bat roosting features. These locations are annotated on Figure 7.5, and comprise: Oak Park, Crondall (Section D) – NW7; Bourely and Long Valley SSSI (Section D) – NW12 and NW13; Old Ively Road (Section D) – NW15; Cove Brook (Section E) – NW16; Queen Elizabeth Park (Section E) – NW18; Frith Hill (section E) – NW20); Colony Bog and Bagshot Heath SSSI (Section F) – NW21; and Monk’s Walk North & West (incl. M3 Exchange Land) SNCI (Section F) – NW25.
- 7.5.686 Of those trees that remain within the Order Limits that have bat roosting potential, 121 with high potential for roosting bats and 335 trees with moderate potential for roosting bats have been identified. Three trees support confirmed bat roosts of common pipistrelle.
- 7.5.687 As described above, good practice measures would reduce the loss of trees with high or moderate roost potential (G174).
- 7.5.688 As required under the Conservation of Habitats and Species Regulations 2017, all works affecting bat roosts in trees would be subject to an EPS licence. Good practice measures would be consistent with the approaches set out in the REAC. Appendix 7.17 Protected and Controlled Species Legislation Compliance Report further considers the specific requirements on the project of EU and national protected species legislation and sets out likely measures to mitigate the loss of roosting features e.g. the provision of appropriate bat boxes and/or resurrection of roost features into retained trees.
- 7.5.689 Alternative roost structures (bat boxes) would be provided (with landowner consent) on retained trees within the Order Limits. Three boxes would be provided for all trees with moderate bat roost potential to be felled. Five boxes would be provided for all trees with high bat roost potential to be felled (G56). Retained areas within the Order Limits suitable for this purpose are shown on Figure 7.5. This good practice measure would avoid a net loss of potential bat roosting habitat.

Foraging habitat

- 7.5.690 Bats are insectivores and loss of habitats that support invertebrate populations due to vegetation clearance within the construction working width across the project would potentially remove bat foraging habitat.
- 7.5.691 Foraging habitat for bats within the Order Limits comprise over 93ha of grassland, approximately 2.1ha marshy grassland and 35.83ha of semi-natural broadleaved woodland, see Table 7.9. These habitats are common and widespread in the local landscape and will support sufficient invertebrate food sources for any bats directly impacted within the Order Limits.
- 7.5.692 Habitat loss within the Order Limits would be temporary. 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).

Commuting habitat

- 7.5.693 Bats use linear habitat features in the landscape along which commute to access roosting sites and foraging habitat. The temporary loss of hedgerow habitat across the project would total approximately 2,500m across approximately 250 individual hedgerows. However, there is a project commitment to only utilise a 10m width when crossing through boundaries between fields where these include hedgerows, trees or watercourses (O1). Reinstatement of hedgerows would be as per good practice measure G88. In addition, good practice measure G93 states that hedgerows, fences and walls would be reinstated to a similar style and quality to those that were removed, with landowner agreement.
- 7.5.694 Nevertheless, hedgerow gaps of approximately 10m can have impacts on commuting bats (JNCC, 2001). However, there is a difference between a bat's *reliance* on linear landscape features and a bat's *preference* for commuting along them. Regardless of the broad preferences, gaps of 10m or wider are routinely crossed by a significant number of species (Andrews, 2018) including the 13 bat species recorded within 1km of the Order Limits (see Appendix 7.7 Bat Factual Report). Scientific literature shows that all of the species within the study area are capable of moving freely over the landscape e.g. crossing major roads (Zeale *et al.*, 2012), crossing fields to reach foraging habitat and return to roosts (Harris and Yeldon, 2008) and crossing gaps of over 200m (Downs and Racey, 2006). As such, a temporary 10m wide gap in a linear habitat is considered extremely unlikely to result in a barrier to commuting bats.
- 7.5.695 To avoid or reduce the illumination of hedgerows and any potential cumulative effect that would deter bats from crossing gaps in hedgerows, 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). Relevant guidance on mitigating the impact of artificial lighting on bats would be applied where practicable. This includes good practice measures that would: limit illumination of confirmed bat roosts, or trees with moderate or high potential to support bat roosts; and limit times that the lights are on and consider factors such as height of lighting columns and use of light sources with minimal ultraviolet (G46).
- 7.5.696 Based on the above, the potential impact would be of small magnitude as a result of roost loss or roost feature loss, and of minor adverse significance. The potential impact of loss and fragmentation of foraging and commuting habitat is of small magnitude and minor adverse significance.

Disturbance

- 7.5.697 Retained tree roosts within or immediately adjacent to the Order Limits that are not directly affected by installation activity may be affected by disturbance caused by noise, light or vibration. Bats commuting or foraging in retained habitats within or adjacent to the Order Limits may also be affected by noise, vibration or light disturbance.

- 7.5.698 Noise and vibration during construction has the potential to disturb bats whilst they roost during the day, if roosts are located immediately adjacent to the proposed construction works area. Such disturbance may cause bats to depart from their roosts prematurely during daylight hours, increasing their exposure to predation. Hibernating bats may also be prematurely woken; this increases energy expenditure that cannot easily be replaced and so reduces their chances of surviving the winter (Mitchell-Jones, 2004). Roosts may also become temporarily unsuitable for use in the period during which disturbance occurs, resulting in a temporary loss of roost sites.
- 7.5.699 Noise disturbance affecting foraging bats has not been well studied although excessive noise can affect foraging efficacy in those species that hunt through 'passive listening' for prey (i.e. gleaning bats) with noise also potentially impairing how bats receive echolocation responses (e.g. Siemers and Schaub, 2011 and Schaub *et al.*, 2008).
- 7.5.700 There is little published information relating to bat tolerance to noise disturbance. However, it is considered likely that the physical structure of a tree roost would provide buffering for roosting bats from noise generated by construction activities outside. The greatest potential for noise disturbance to roosting bats is likely to arise during activities directly affecting roost structures, or those within 10m of retained roosts.
- 7.5.701 Noise-generating activities would vary spatially and temporally during the construction period. In rural areas (where there is a higher risk of bat presence), it is expected that pipelaying would be typically undertaken at a rate of approximately 450m per week, after which much of the construction activity would move into adjacent work areas. Therefore, any bat roosts present would potentially be subject to only very short-term, and irregular, increases in noise levels.
- 7.5.702 Furthermore, construction works would largely be restricted to daytime activities, which would avoid the sensitive emergence and re-entry times for bats that may be present in retained trees. Daytime works would also avoid disturbance during foraging periods when increased noise levels may affect foraging efficiency.
- 7.5.703 Where sensitive features (e.g. trees with potential and confirmed bat roosts), are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. A suitable method statement would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).
- 7.5.704 Lighting can have both positive and negative effects upon bats, depending on species. Delays to bat emergence from roosts are likely if roost exits are lit, reducing the period available for foraging (BCT, 2009). Artificial lighting can reduce invertebrate assemblages on a site, thus affecting foraging success (BCT, 2009). Conversely, increased lighting can be beneficial for some species of bat (e.g. noctule and pipistrelle) as they forage prey that are attracted to light (BCT, 2009). Lighting also has a high potential for causing many species of bats (particularly broad winged, slow-flying species such as long-eared and *Myotis* bats) to avoid the lit area, potentially resulting in losses of foraging and/or roosting habitats.



- 7.5.705 Construction would require temporary lighting although this would be concentrated at temporary compound locations, drilling sites and occasional winter working areas along the pipeline route. The previously described good practice measures (i.e. G45 and G46) would reduce any impacts of disturbance caused by lighting.
- 7.5.706 Based on the above, the potential disturbance impact on bats would be of negligible magnitude and minor adverse significance.

Table 7.32: Summary of Potential Impacts on Biodiversity - Bats

Potential Impact	Value	Magnitude	Significance
Mortality and injury	High	Negligible	Negligible
Habitat loss/gain, fragmentation or modification	High	Small	Minor
Disturbance	High	Negligible	Minor

Breeding Birds (Outside of Statutory Designated Sites)

Mortality and Injury

- 7.5.707 The mortality and injury of species could potentially occur during vegetation clearance and during topsoil stripping. Mortality and injury could occur to adults and dependent young and via destruction of eggs. The effects to nests and eggs could occur to both tree/scrub and ground-nesting species.
- 7.5.708 The assumption would be that vegetation with the potential to support bird nests would not to 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 Environmental Clerk of Works (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 (G35).
- 7.5.709 Construction works would comply with relevant protected species legislation with regards to Schedule 1 birds. Appropriate licences would be obtained where necessary from NE 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 (G43).
- 7.5.710 These good practice measures, as summarised would see that the potential effect of mortality and injury on breeding birds is of negligible magnitude and negligible significance.

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.711 Vegetation clearance works would remove habitat suitable for breeding birds. However, working widths would be reduced in specific locations where trees or hedges are present. Where notable trees would be retained within or immediately adjacent to the Order Limits, the trees and their root protection areas would be protected where they extend within the Order Limits and are at risk. This would be by means of fencing or other measures (G65).



- 7.5.712 The maximum approximate losses of woodland, scrub and hedgerow habitats as well as grassland and heathland habitats are summarised in Table 7.9. However, the actual area of habitats would be much lower once consideration of narrow width working (see Figure 7.5) is made. Nevertheless, these habitats are widely available within the wider landscape and vegetation loss would be, in the main, temporary as habitats would be reinstated post-construction.
- 7.5.713 Barn owl boxes would be provided for barn owls as necessary. Two boxes per roost would be positioned a minimum of 40m away from the likely construction zone of disturbance (G58).
- 7.5.714 The direct loss of foraging, nesting and roosting habitat would be of a small magnitude and minor adverse significance.

Disturbance

- 7.5.715 The pathways by which disturbance effects could occur include noise, vibration and visual disturbance. Disturbance of breeding birds could adversely affect the survival, range and abundance of certain species, although susceptibility to disturbance does vary between species, from total avoidance through to rapid habituation (e.g. see Cutts *et al.*, 2009; Latimer *et al.*, 2003).
- 7.5.716 Following vegetation clearance, it is highly likely that only breeding birds in habitats around the boundary of the Order Limits would be affected. Where sensitive features (such as active bird nests) are to be retained within or immediately adjacent to the Order Limits, an appropriate buffer zone would be created where this extends within the Order Limits. The buffers would be established using appropriate fencing and signage. A suitable method statement would be produced to ensure that construction works are undertaken in a manner that reduces the risk of damage or disturbance to the sensitive feature (G40).
- 7.5.717 The effects of visual disturbance from mobile construction teams would vary spatially and temporally, depending on the activity being undertaken. However, pipelaying would be typically undertaken at a rate of approximately 450m per week in rural areas and 90m per week in urban areas, limiting potential for disturbance.
- 7.5.718 Good practice construction measures relating to noise and lighting would be adhered to, as set out in the REAC. Potential effects arising from these sources would therefore be avoided or reduced.
- 7.5.719 Pre-construction surveys would be completed if existing baseline survey data need to be updated or supplemented (G33).
- 7.5.720 The potential disturbance impact on breeding birds would be of small magnitude and of minor adverse significance.

Table 7.33: Summary of Potential Impacts on Biodiversity - Breeding Birds

Potential Impact	Value	Magnitude	Significance
Mortality and injury	Low	Negligible	Negligible
Habitat loss/gain, fragmentation or modification	Low	Small	Minor
Disturbance	Low	Small	Minor

Dormouse

Mortality and Injury

- 7.5.721 Dormouse presence has been confirmed or assumed in hedgerow, scrub and woodland habitats in Sections A, B, C, D and E (see Figure A7.9.1 in Appendix 7.9 Dormouse Factual Report).
- 7.5.722 Where vegetation clearance of habitats suitable for dormouse in Sections A to E would occur, there is the potential for the killing or injury of dormice.
- 7.5.723 To achieve compliance with the Conservation of Habitats and Species Regulations 2017, good practice measures would be secured through an EPS licence. The proposed good practice measures are described in Appendix 7.14 Draft Dormouse EPS Licence Application and summarised below:
- finger-tip searches by a licensed ecologist immediately prior to vegetation clearance;
 - single-stage vegetation clearance of boundary features (i.e. hedgerows and lines of trees) timed to avoid the breeding season;
 - two-stage vegetation clearance of woodland timed to avoid the breeding season;
 - provision of dormouse boxes to mitigate the temporary loss habitat; and
 - habitat reinstatement (as per measures G88 and G93).
- 7.5.724 Given the above, the potential impact of dormouse mortality or injury is of negligible magnitude and negligible significance.

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.725 Out of approximately 418ha of land within the Order Limits, approximately 3.6ha of suitable (optimal and sub-optimal) dormouse habitat would be temporarily impacted by the installation of the pipeline in Sections A to E.
- 7.5.726 Within the Order Limits where dormouse presence has been confirmed or assumed, approximately 1,160m of linear habitat would be temporarily removed. This impact would be spread across 116 different boundary crossings (i.e. a 10m wide gap in each). All of these losses would be within Sections A to D.
- 7.5.727 Woodland blocks supporting dormice would only be affected in Sections B, D and E and account for approximately 3.29ha of habitat loss.
- 7.5.728 The proposed pipeline would be buried below the ground. All habitat loss would be temporary as removed vegetation would eventually regenerate naturally.
- 7.5.729 Potential loss of woodland, scrub and hedgerow habitats may cause resident dormice to alter normal behaviours, potentially increasing their exposure to predation, increasing energy expenditure that cannot easily be replaced and so reducing their chances of surviving the winter. Habitats may also become temporarily unsuitable for foraging or nesting dormouse. However, for potential effects to be significant, they would be detrimental to the maintenance of the



population of the species at a favourable conservation status, as per the requirements of Regulation 55(9)(b) of the Conservation of Habitats and Species Regulations 2017.

- 7.5.730 The contractor(s) would comply with relevant protected species legislation including with regards to dormice. Appropriate licences would be obtained where necessary from NE for all works affecting protected species as identified by the ES 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. (G43).
- 7.5.731 Clearance of habitats suitable for dormouse, in locations where dormice are confirmed or assumed to be present (see Appendix 7.9 Dormouse Factual Report), would comprise approximately 116 boundary feature crossings (i.e. hedgerows or lines of trees). There is a commitment to only utilise a 10m width when crossing through boundaries between fields where these include hedgerows, trees or watercourses (O1).
- 7.5.732 Approximately 3.6ha of woodland and scrub habitats in locations where dormice are likely to be present would also be impacted (see Figure D in Appendix 7.14 Draft Dormouse EPS Licence Application).
- 7.5.733 The predicted habitat loss would be temporary as all hedgerows would be reinstated post-works, as previously described (i.e. G88, G93, G97). These measures would see that habitat connectivity is maintained in the long term. It is expected that replacement planting would be sufficiently established so that it is suitable for use by dormice in the medium term (five to 15 years).
- 7.5.734 Temporary fragmentation of hedgerow habitat would arise during the construction works phase. However, although dormice may typically avoid crossing gaps in habitats, increasing amounts of scientific recording have identified dormice crossing 'open' habitats, for example garden lawns to reach bird feeders (Carroll, 2008), isolated scrub surrounded by tarmac (Wouters *et al.*, 2010), and roads (Chanin and Gubert, 2012). Moreover, Juškaitis (2008) reported several examples of dormice crossing distances of 5m to 50m across the ground. The majority of hedgerows in the study area support farmer's access gates, which are typically at least 4m wide. As such, dormice living in hedgerows must be capable of crossing moderately sized gaps (although they may well prefer not to site their home ranges in hedges with a lot of them) (Chanin, 2012).
- 7.5.735 As described in Appendix 7.9 Dormouse Factual Report, dormice have strongholds in Hampshire and parts of Surrey. It is therefore considered that the temporary creation of a single 10m wide gap in hedgerows would not affect the favourable conservation status of dormice, especially given the ability of this species to cross narrow gaps between suitable areas of habitat.
- 7.5.736 Based on the above, the potential impact on dormouse due to potential habitat loss and fragmentation is of small magnitude and minor adverse significance.



Disturbance

- 7.5.737 Dormice are sensitive to direct disturbance associated with habitat clearance, although their sensitivity to construction disturbance in adjacent retained habitats is less understood. Disturbance could occur in response to noise and vibration from ground works and provision of temporary artificial lighting. This could result in increased energy expenditure that is difficult to replace, avoidance behaviours or inducement of stress that could have impacts on the condition of individuals and subsequent survival and reproductive success.
- 7.5.738 However, dormice are frequently recorded in habitats subject to background noise and visual disturbance, such as alongside motorways and major roads. Dormice were also recorded in nest boxes immediately adjacent to a haul road for a motorway widening project in South Wales throughout its two-year construction period (unpublished consultancy document by Jacobs to Welsh Government). This would suggest that dormice are tolerant of some close-proximity disturbance.
- 7.5.739 In areas supporting dormice, there would be retained habitat within or immediately adjacent to the Order Limits to which disturbed dormice could disperse. Potential disturbance of dormice would also be avoided or reduced through the previously described good practice measures relating to noise, lighting, and reduced-width working at boundary features and woodland.
- 7.5.740 Given the above, potential disturbance to dormice is predicted to be of small magnitude and minor adverse significance.

Table 7.34: Summary of Potential Impacts on Biodiversity - Dormouse

Potential Impact	Value	Magnitude	Significance
Mortality and injury	Medium	Negligible	Negligible
Habitat loss/gain, fragmentation or modification	Medium	Small	Minor
Disturbance	Medium	Small	Minor

Fish

- 7.5.741 Fish are a sensitive receptor within the aquatic environment and may respond quickly and decisively to environmental changes caused by construction activity. This may be in the form of a behavioural or physical response. Fish species demonstrate different susceptibilities to environmental change, often with relatively narrow ranges of tolerance to noise, light, water quality and habitat modification. For the purposes of this assessment the highest sensitivity has been assumed to represent the fish community.
- 7.5.742 All works within or adjacent to watercourses would be carried out in accordance with the requirements of permits and licences agreed with either the Environment Agency or relevant Local Lead Flood Authority or in accordance with the provisions of the DCO (G123).
- 7.5.743 Further information with respect to impacts to watercourses is provided in Chapter 8 Water.

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.744 Migratory species are of principal concern for potential habitat fragmentation effects. Within the project, migratory species are broadly confined to the larger watercourses which would be crossed using trenchless methods: WCX002a (TC001); WCX019 (TC008); WCX048 (TC016); WCX051 (TC020); WCX066 (TC022); WCX095 (TC033); and WCX096 (TC034) (Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report). The use of trenchless crossing methods to cross the most sensitive watercourses for fish would avoid potential impacts of habitat loss from coarse and salmonid fish populations along main river corridors.
- 7.5.745 However, Caker Stream (WCX012 – although dry at time of survey) and Ively Brook (WCX047) which both have high sensitivity for fish species would be crossed using open cut trench construction techniques. There may also be potential for brown trout and eel to utilise minor tributaries (WCX021, WCX067 and WCX068), including ephemeral watercourses. Resident fish may also undertake localised migrations between functional habitats (feeding, spawning, juvenile) which are susceptible to breaks in channel continuity.
- 7.5.746 Temporary and short-duration fragmentation of migratory pathways for fish may occur as a result of open trench crossings of watercourses during pipeline excavation at approximately 61 of the 85 watercourses crossed. Of these, approximately 14 watercourses are those with high sensitivity for fish (see Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report). Habitat fragmentation may result from watercourse diversions forming a barrier to fish movement due to changes in flow types and lighting effects at the entry and exit interfaces. This would only affect open cut crossings.
- 7.5.747 To reduce the impacts to Salmonid migration periods (October to December) and course fish spawning (March to May), open cut crossings on five watercourses would be subject to constraints. The tributary of Cove Brook (WCX047) would be subject to constraints between March and May. The tributary of the River Hamble (WCX007), ditch leading to the tributary of the River Hamble (WCX006), Caker Stream (WCX012) and Ryebridge Stream (WCX021) would be subject to constraints between October to December and March to May. At all five locations, works undertaken in the channel or close to bank tops would be reduced/restricted during these sensitive periods (G171).
- 7.5.748 Furthermore, direct impacts to watercourses and riparian habitat would be reduced through the previously described embedded measure O1 and good practice measure G122. Appropriate buffer zones would be established within Order Limits adjacent to identified watercourses (G39). The contractor(s) would ensure that the time the trench is open in the vicinity of certain features, would only be as long as necessary for the installation of the pipeline. The required dewatering of the trench would be undertaken only as and when necessary to enable safe working and preparation for pipe installation (G132).
- 7.5.749 Reinstatement of impacted sections of watercourse would be in accordance with previously described commitments set out in the REAC.



- 7.5.750 Given the above, the potential temporary habitat loss/gain, fragmentation or modification impact on freshwater fish is of small magnitude and minor adverse significance. The potential temporary habitat fragmentation impact on migratory freshwater fish is of small magnitude and minor adverse significance.

Mortality and Injury

- 7.5.751 During construction there is the potential for the mortality or injury of fish to occur within watercourses to be crossed using open cut, especially those 14 watercourses where sensitivity for fish has been identified. This could occur where supporting habitat is removed, cofferdams are inserted into the watercourse and/or crossing areas are dewatered.
- 7.5.752 The use of trenchless crossing methods to cross the most sensitive watercourses for fish would avoid the potential mortality and injury effect from coarse and salmonid fish populations along main river corridors WCX002a (TC001); WCX019 (TC008); WCX048 (TC016); WCX051 (TC020); WCX066 (TC022); WCX095 (TC033); and WCX096 (TC034) (Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report).
- 7.5.753 Where open cut and in-channel works are proposed (WCX012, WCX021, WCX047, WCX067 and WCX068) fish mortality and injury could arise. To avoid this impact, 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 (G49).
- 7.5.754 Given the proposed embedded and good practice measures, the potential mortality and injury impact on freshwater fish is of negligible magnitude and negligible significance.

Disturbance

- 7.5.755 Potential disturbance impacts on fish during construction could arise through noise (vibration) and artificial lighting within the vicinity of watercourse crossings, notably at the 14 locations of higher sensitivity (see Figure A7.5.1 in Appendix 7.5 Aquatic Ecology Factual Report).
- 7.5.756 Noise (vibration) emissions during construction have the potential to create a deterrent to fish species, preventing or delaying migrating of species through watercourses and the creation of avoidance behaviours in resident species. Construction activities such as earthworks, vehicle movements, or drilling in the vicinity of a watercourse could generate ground-borne vibrations that may propagate into watercourses. Depending on the frequency, content and levels of noise, this may have the potential to affect sensitive species and at various life stages.
- 7.5.757 Lighting has the potential to disrupt migration of sensitive species as well as affect the behaviour of resident species. Territorial species may leave an illuminated area adjacent to the works to find new territories, resulting in increased competition elsewhere.



7.5.758 Good practice measures would be employed to avoid or reduce these effects. Appropriate buffer zones would be established within the Order Limits adjacent to identified watercourses (G39). 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). This would be implemented to reduce disturbance effects on all watercourses, including those where in-channel works are not required.

7.5.759 The potential disturbance impact on freshwater fish is of small magnitude and of minor adverse significance.

Table 7.35: Summary of Potential Impacts on Biodiversity - Fish

Potential Impact	Value	Magnitude	Significance
Mortality and injury	Medium/low	Negligible	Negligible
Habitat loss/gain, fragmentation or modification	Medium/low	Small	Minor
Disturbance	Medium/low	Small	Minor

Great Crested Newt

Mortality and Injury

7.5.760 Vegetation clearance, removal of turf, topsoil and subsoil excavation, and machinery movements within the Order Limits all have the potential to kill and injure GCN within 250m of ponds with confirmed GCN presence (see Figure A7.6.2 in Appendix 7.7 Great Crested Newt Factual Report). GCN may also become trapped within excavations left open overnight.

7.5.761 Appropriate licences would be obtained where necessary from Natural England for all works affecting GCN as identified by the ES and through pre-construction surveys. All relevant works would be undertaken in accordance with the relevant good practice measures and conditions set out in those licences.

7.5.762 Good practice measures carried out under an EPS licence would be required, as described in the GCN draft EPS Method Statement (see Appendix 7.15 Draft Great Crested Newt EPS Licence Application). These would comprise the trapping, translocation and/or fingertip searching of suitable habitats within 250m of ponds confirmed as supporting GCN.

7.5.763 The proposed pipeline would not create any permanent features or activities that could result in long-term mortality/injury to GCN e.g. open excavations or increases in traffic. Where there would be a risk of animal entrapment, a means of escape would be installed into all excavations left open overnight (G60). Potential disturbance to ponds would preferably be timed to avoid the amphibian breeding season or would be supervised by an ECoW. Any amphibians captured during supervision would be translocated to the nearest undisturbed retained pond (G59).

7.5.764 The good practice measures would see that the proposed works were not detrimental to the maintenance of the GCN population at a favourable conservation status, as required by Regulation 55(9)(b) of the Conservation of Habitats and Species Regulations 2017.



- 7.5.765 Given the above, the potential impact of injury and mortality of GCN is of negligible magnitude and negligible significance.

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.766 Good practice guidance advises that suitable habitats within 250m of a breeding pond are likely to be used most frequently by GCN if there is an absence of dispersal barriers. Small-scale losses of terrestrial habitat, especially over 250m from the breeding pond, are also considered unlikely to have significant effects on GCN (English Nature, 2001). As such, it is considered that the effects of habitat loss and fragmentation would only be experienced within 250m of the GCN ponds. However, for potential effects to be significant, they would be detrimental to the maintenance of the population of the species at a favourable conservation status, as per the requirements of Regulation 55(9)(b) of the Conservation of Habitats and Species Regulations 2017.
- 7.5.767 Terrestrial habitat used by GCN would be directly impacted during construction by vegetation clearance, removal of turf, topsoil and subsoil excavation within 250m of GCN ponds. There is the potential to temporarily damage core (i.e. habitat within 50m of GCN ponds) habitat and refuge sites near Ponds 57a, 128, 129a, 180, 194a, 201, 223, and 223a. Core habitat and refuge sites are typically of high importance for GCN. All other GCN ponds are beyond 50m from the Order Limits and no impacts to core habitat are predicted at these locations. No ponds would be directly impacted as a result of proposed construction activities.
- 7.5.768 Based on a zone of 250m around the ponds where GCN were present, approximately 24.15ha of suitable habitat for the species would be affected by vegetation clearance and/or groundworks, as detailed in Appendix 7.15 Draft Great Crested Newt EPS Licence Application. Of this, approximately 1.55ha of temporary habitat loss would be within 50m of GCN ponds with the remaining 22.6ha between 50 and 250m of GCN ponds. When considered in the context of the 90km long pipeline route, the area of GCN habitat impacted by the project is considered to be small. Due to the temporary nature of the habitat loss (all habitats to be reinstated after works), the effects of habitat loss and fragmentation are minor. There would be no permanent loss of terrestrial habitat within 250m of GCN ponds.
- 7.5.769 The proposed installation works are predicted to take approximately two years to complete. Pipelaying would be typically undertaken at a rate of approximately 450m per week in rural areas and so would only affect individual areas for relatively short durations. Once the proposed installation works are complete, 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). Reinstatement would be complete within the short term.
- 7.5.770 The proposed pipeline would be buried below ground. As such, there would be no barrier to dispersal or fragmentation impact once the affected habitats have reinstated.
- 7.5.771 The proposed pipeline would not create any permanent features or activities that could result in long-term disturbance or mortality/injury to GCN e.g. open excavations, increases in traffic.



- 7.5.772 The use of exclusion fencing around pipelines or other linear projects can result in temporary fragmentation effects by isolating (meta)populations or individual animals from breeding, hibernation or foraging habitat. The potential for fragmentation impacts to arise on this project has been considered but the risk is thought to be low due to the typically localised areas to be fenced (only 250m from ponds, as opposed to a possible 500m), the typically small populations of GCN present, and the relatively short duration that the exclusion fences would be in place for (the construction period for the entire project is predicted to be approximately two years). A negligible fragmentation impact is predicted, even under a worst-case scenario of fences being in place during installation.
- 7.5.773 Implementation of the good practice measures outlined in Appendix 7.15 Draft Great Crested Newt EPS Licence Application and reinstatement of terrestrial habitats would result in a potential habitat loss impact of small magnitude and minor adverse significance.

Table 7.36: Summary of Potential Impacts on Biodiversity – Great Crested Newt

Potential Impact	Value	Magnitude	Significance
Mortality and injury	Medium	Negligible	Negligible
Habitat loss/gain, fragmentation or modification	Medium	Small	Minor

Rare Reptiles (Sand Lizard)

Mortality and Injury

- 7.5.774 Installation of the pipeline at Chobham Common SSSI would result in the temporary damage of habitats within the Order Limits and could lead to the mortality or injury of individual sand lizards, should they be present within the Order Limits whilst works are taking place.
- 7.5.775 Potentially disturbing construction works within the Thames Basin Heaths SPA would be undertaken between 1 October and 31 January unless otherwise agreed with Natural England (G38). As this is the period when sand lizards would be hibernating, any animals encountered during this time would be particularly vulnerable and would be unlikely to survive.
- 7.5.776 A sand lizard EPS licence would be required for construction works in Chobham Common. Appendix 7.16 Draft Rare Reptiles EPS Licence Application details proposed good practice measures to avoid killing or injuring sand lizard. These measures involve the use of habitat manipulation, fingertip searching and/or trapping and translocation.
- 7.5.777 The proposed measures would see that installation works were not detrimental to the maintenance of the sand lizard population at a favourable conservation status, as required by Regulation 55(9)(b) of the Conservation of Habitats and Species Regulations 2017.
- 7.5.778 Given the above, a potential impact on sand lizard due to mortality or injury would result in a potential impact of negligible magnitude and negligible significance.



Habitat Loss/Gain, Fragmentation or Modification

- 7.5.779 The total area within the Order Limits at Chobham Common SSSI is approximately 14ha. However, only approximately 2.5ha of habitat within the Order Limits that is suitable for sand lizard would be affected by pipeline installation activities (Figure 1.D in Appendix 7.16 Draft Rare Reptiles EPS Licence Application).
- 7.5.780 The Order Limits form only a small part of a very large area of interconnected suitable habitat (approximately 2% of the total SSSI area) within the wider landscape.
- 7.5.781 At Chobham Common the working width would be reduced to 20m (maximum) (Figures 7.6 to 7.9). This working width is a reduction from that which would typically be used on other, less sensitive areas of the pipeline route. Furthermore, the Order Limits encompass areas identified for habitat mitigation (e.g. targeted secondary woodland and scrub removal) and these would be protected during the pipeline installation phase.
- 7.5.782 Three trenchless crossings (TC024, TC025 and TC026) are proposed in Chobham Common SSSI to cross areas of wetland. There would therefore be no effects of habitat loss associated with pipeline installation (see Figure 1.D in Appendix 7.16 Draft Sand Lizard EPS Licence Application). Above-ground construction activities in areas supporting wetland habitats would comprise vehicle and personnel movements and pipe storage, these would be restricted to the existing access track where practicable.
- 7.5.783 Topsoil stripping would be reduced to a minimum extent within European sites and SSSIs except where identified within the HRA (**application document 6.5**) (some unavoidable stripping would take place as part of the trenching for the pipeline and in construction compounds where matting is not a workable alternative) (HRA4). Where works in wet heath would be unavoidable, effects on soils and surface vegetation would be reduced through the use of ground protection matting and appropriate machinery where practicable (G51).
- 7.5.784 In areas affected by open cut trenching, the proposed installation works would result in the temporary modification or damage of habitats within the works corridor. However, heathland within statutory or non-statutory designated wildlife sites would be reinstated using natural regeneration, unless otherwise agreed with Natural England (HRA1).
- 7.5.785 The proposed pipeline would be buried below the ground and there would be no permanent above ground infrastructure within Chobham Common. All areas of habitat loss would be temporary, to be restored through natural regeneration on completion of the works. Soil disturbance and natural regeneration is consistent with standard conservation measures for the restoration and management of heathland, and there is a high degree of confidence that disturbed habitats could be reinstated as pioneer heathland or acid grassland in the short to medium term by these methods (Gimingham, 1992). Full regeneration to acid grassland and pioneer heathland is anticipated to occur within five years following construction.



7.5.786 Replacement hibernacula and refugia would be provided within the Order Limits to mitigate habitat loss to reptiles and amphibians (G53).

7.5.787 Given the above and the measures described in Appendix 7.16 Draft Rare Reptiles EPS Licence Application, no long-term impacts as a result of habitat loss or modification are predicted. The potential habitat loss impact is of small magnitude and minor adverse significance.

Disturbance

7.5.788 During the construction period, there is potential that disturbing activities could cause stress to individual animals and compromise survival and reproduction rates.

7.5.789 By the time disturbing construction activities commence, most of the reptiles within the Order Limits would have dispersed in line with the strategy outlined in Appendix 7.16 Draft Rare Reptiles EPS Licence Application (i.e. habitat manipulation, fingertip searching and/or trapping and translocation). The effects of disturbance could be experienced by reptiles within retained habitats in the immediate vicinity of the Order Limits. However, during the active season, it is expected that sand lizard would disperse into the extensive areas of retained habitat elsewhere within Chobham Common.

7.5.790 Reptiles are more susceptible to disturbance during the hibernation period. As such, adder and sand lizard hibernacula would be retained and protected during construction where practicable. If unavoidable, the removal of vegetation and groundworks at hibernacula would be timed to avoid the hibernation season (G52).

7.5.791 Previously described good practice measures to reduce noise generated by construction activity would also be implemented, as set out in the REAC. This would further reduce the magnitude of noise disturbance to sand lizard.

7.5.792 As such, the potential disturbance impact to sand lizard is of negligible magnitude and minor adverse significance.

Table 7.37: Summary of Potential Impacts on Biodiversity – Rare Reptiles

Potential Impact	Value	Magnitude	Significance
Mortality and injury	High	Negligible	Negligible
Habitat loss/gain, fragmentation or modification	High	Small	Minor
Disturbance	High	Negligible	Minor

Common Reptiles

Mortality and Injury

7.5.793 All activities that involve the clearance of areas containing suitable reptile habitat (e.g. heathland, unmanaged grassland, scrub and tall ruderal) could result in mortality and injury of adder, grass snake, slow worm and common lizard (see Figure 7.4).

7.5.794 All habitats suitable for common reptiles would be subject to habitat manipulation as set out in measure G196, detailed above and included in the REAC. This would



involve a combination of phased and directional habitat manipulation to encourage reptiles to move away from the works area, sensitive removal of suitable refuge features, and supervision of works by an ECoW. Appendix 7.17 Protected and Controlled Species Legislation Compliance Report further considers the specific requirements on the project of national protected species legislation.

- 7.5.795 Habitat with the potential to support hibernating reptile would not to be removed between November and March without supervision by the ECoW, or unless previous mitigation has been implemented to exclude, remove, or encourage these animals from the works area (e.g. habitat manipulation for reptiles) (G37). These measures would be in accordance with good practice guidelines (HGBI, 1998).
- 7.5.796 Based on the implementation of good practice measures, the potential mortality and injury impact on common reptiles is of negligible magnitude and negligible significance.

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.797 All suitable habitat for reptiles within areas with known or potential common reptile presence within the Order Limits could be temporarily lost. A loss of hibernation, breeding, basking and feeding habitats could cause behavioural changes requiring the use of additional energy from reduced resources with subsequent effect on survival and breeding success.
- 7.5.798 Impacts to habitat features of value for reptiles would be avoided or reduced, where practicable. For example, earth banks within SSSIs which are likely to be of importance for common reptiles should be avoided and protected, where practicable. If their removal is unavoidable during construction, the banks should be reinstated (G57).
- 7.5.799 Adder hibernacula can be very important as large numbers of these animals can make use of a single hibernaculum each year. Therefore, the loss of such a feature could adversely affect the local conservation status of the species, especially if adder were present at the time. Habitat with high suitability for adder hibernacula have been identified on SSSI sites (see Appendix 7.11 Reptile Factual Report). Pre-construction surveys would be completed if existing baseline survey data need to be updated or supplemented (G33). This would include to confirm the use of individual habitat features as hibernacula. Adder and sand lizard hibernacula would be retained and protected during construction where practicable. If unavoidable, the removal of vegetation and groundworks at hibernacula would be timed to avoid the hibernation season (G52).
- 7.5.800 Replacement hibernacula and refugia would be provided within the Order Limits to mitigate habitat loss to reptiles and amphibians (G53).
- 7.5.801 In the context of the pipeline's length, the temporary nature of the impact, and the availability of retained habitats within the wider landscape, the loss of reptile habitat is minor.
- 7.5.802 Given the above, the potential habitat loss/fragmentation impact on common reptiles is of negligible effect and minor adverse significance.



Disturbance

- 7.5.803 As described for sand lizard, there is potential that disturbing activities could cause stress to individual animals and compromise survival and reproduction rates. The previously described good practice measures (e.g. habitat manipulation and sensitive timing of works) would reduce the potential effects of disturbance to acceptable levels.
- 7.5.804 As such, the potential disturbance impact on common reptiles is of negligible magnitude and of negligible significance.

Table 7.38: Summary of Potential Impacts on Biodiversity – Common Reptiles

Potential Impact	Value	Magnitude	Significance
Mortality and injury	Low	Negligible	Negligible
Habitat loss/gain, fragmentation or modification	Low	Negligible	Minor
Disturbance	Low	Negligible	Negligible

Otter and Water Vole

Mortality and Injury

- 7.5.805 No otter holts or laying-up sites have been identified and so there is a negligible risk of mortality or injury to sheltering otter. As otter are highly mobile animals that would readily disperse away from sources of disturbance, there is a negligible risk of mortality or injury arising due to collision with construction plant or machinery. The proposed pipeline would not create any permanent features or activities that could result in mortality/injury to otter e.g. open excavations, increases in traffic.
- 7.5.806 No water vole burrows or nests were recorded within the watercourses subject to field survey.
- 7.5.807 As such, the potential impact of mortality and injury on otter and water vole is of negligible magnitude and negligible significance.

Habitat Loss/Gain, Fragmentation or Modification

- 7.5.808 Potential loss, fragmentation or modification of aquatic and terrestrial habitats could reduce access and availability to commuting and feeding resources for riparian mammals. This could lead to additional energy expenditure the search for alternative suitable habitats, potentially reducing condition or reproductive potential.
- 7.5.809 Riparian habitat loss for foraging and commuting otter and water vole would be temporary and limited to the approximately 61 watercourse crossings affected by open cut trenching (although many of these are minor field drains with negligible potential for riparian mammals). At these locations, direct habitat loss would be restricted to a maximum of 10m in width, as per overarching commitment O1 and good practice measure G122. The contractor(s) would ensure that the time the trench is open in the vicinity of certain features, would only be as long as necessary for the installation of the pipeline. The required dewatering of the trench would be undertaken only as and when necessary to enable safe working and preparation for pipe installation (G132).



- 7.5.810 The riparian vegetation and natural bed of the watercourse would be reinstated using the material removed when appropriate on completion of the works and compacted as necessary; if additional material is required, appropriately sized material of similar composition would be used (G122), as set out in the REAC.
- 7.5.811 The most sensitive main watercourses (River Wey - WCX019 and Blackwater Valley - WCX051) would be crossed using trenchless techniques (TC008 and TC020 respectively), avoiding any potential habitat loss or fragmentation for otter.
- 7.5.812 The crossing of Blackwater Valley (WCX051) could potentially involve open cut construction that would require the temporary removal of reedbed and swamp habitat. Common reed reproduces readily by rhizomes and seed and spreads naturally to wet areas and to water up to 1m deep, with the rhizomes able to grow laterally at a rate of around 1.5m per year (Sussex Wildlife Trust, 2013). *Phragmites* and *Typha* species readily reproduces by seed. Given this strong recolonising ability, the reedbed habitat is expected to reinstate naturally in the short term.
- 7.5.813 Otter make use of terrestrial habitats, although there is no baseline evidence to suggest that this commonly occurs within the field survey study area. Nevertheless, otter are highly mobile species and would be expected to navigate their way around localised, temporary barriers. Water vole are less mobile but if present in the Blackwater Valley and open cut construction techniques were implemented, habitat to both the north and south of the Order Limits would be available for displaced individuals.
- 7.5.814 As such, the potential habitat loss and fragmentation impact on riparian mammals is of negligible magnitude and of minor adverse significance.

Disturbance

- 7.5.815 Disturbance effects could be caused by noise, an increased human presence near to watercourses used by the species, and lighting resulting in avoidance behaviours, additional energy expenditure which may be difficult to replace thereby potentially reducing condition or reproductive success. As no otter holts or lay-up sites or water vole burrows have been identified within the watercourse crossing points, it is considered that the risk of disturbance to riparian mammals is minimal.
- 7.5.816 Pre-construction surveys would be completed if existing baseline survey data need to be updated or supplemented (G33). If water vole presence is confirmed at any location, the project would seek to avoid and retain burrows and suitable habitat within, or immediately adjacent to, the Order Limits. This could be achieved through measures G39 and G40, or by careful alignment of the pipeline within the Limits of Deviation.
- 7.5.817 Good practice measures to reduce noise generated by construction activity would be managed by processes and measures set out in the REAC. Appropriate buffer zones would be established within Order Limits adjacent to identified watercourses (G39). 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).

7.5.818 The potential disturbance impact on riparian mammals is of negligible magnitude and of minor adverse significance.

Table 7.39: Summary of Potential Impacts on Biodiversity – Riparian Mammals

Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Otter	Mortality and injury	Medium	Negligible	Negligible
	Habitat loss/gain, fragmentation or modification	Medium	Negligible	Minor
	Disturbance	Medium	Negligible	Minor
Water vole	Mortality and injury	High	Negligible	Negligible
	Habitat loss/gain, fragmentation or modification	High	Negligible	Minor
	Disturbance	High	Negligible	Minor

Operation

7.5.819 This section describes the receptors and impact pathways that may lead to potential significant effects during the operation phase of the project, as summarised in Table 7.15.

Statutory Designated Sites

Bourley and Long Valley SSSI

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

7.5.820 Groundwater dependent habitats within Bourley and Long Valley SSSI in relation to the Order Limits, comprise wet dwarf shrub heath, valley mire and wet woodland habitats ranging from high, to moderate to low, to moderate groundwater dependency (Figure A8.3.17 in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems).

i) Groundwater flow interception

7.5.821 In areas where the pipeline intersects the water table, the presence of the pipeline could modify the flow of groundwater around it. The back-filled trench could further modify groundwater flows by providing a preferential flow pathway. This groundwater flow interception could lead to changes in groundwater levels and flows on which the wet dwarf shrub heath, valley mire and wet woodland habitats GWDTE present are dependent, leading to potential effects to GWDTE habitats resulting in loss, fragmentation or modification.

7.5.822 Most of the pipeline through Bourley and Long Valley SSSI would be within the unsaturated zone. As such, groundwater flow interception would not occur. The pipeline would likely be below the water table in the area around the spring to the south of Aldershot Road and in the wet woodland around the Gelvert Stream to the north. As the latter area is predominantly surface water dependent, modification of groundwater flows is unlikely to lead to wet woodland habitat loss, fragmentation or modification. This area does not constitute a notified feature of the SSSI.

7.5.823 The wet woodland immediately adjacent to the Aldershot Road and the marshy grassland within the Order Limits are supplied by a groundwater source. The marshy



grassland habitat comprises vegetation referable to M25 *Molinia caerulea-Potentilla erecta* mire, a notified feature of Bourley and Long Valley SSSI. Where required, water stops (or “stanks”) would be installed at intervals through the pipe bedding and side fill (O7) to reduce any potential operational groundwater flow effects. This is part of embedded design to reduce impacts to sensitive GWDTE.

7.5.824 With this embedded design in place, the potential effects from dewatering of GWDTE of at Bourley and Long Valley is of negligible magnitude and negligible significance.

ii) Changes to groundwater quality from pipeline leaks.

7.5.825 In the unlikely event of pipeline leaks during operation there is a risk to water quality of groundwater on which GWDTE are dependent. This could result in potential effects to GWDTE habitats leading to loss, fragmentation or modification. However, pipeline integrity measures have been embedded into the design to reduce the risk so that the likelihood of leaks is very small. As such, the potential effects resulting from changes to groundwater quality through this impact pathway would be of negligible magnitude and negligible significance.

Table 7.40: Summary of Potential Impacts on Biodiversity – Bourley and Long Valley SSSI

Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Bourley and Long Valley SSSI	GWDTE – Groundwater flow interception	High	Negligible	Negligible
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible

Eelmoor Marsh SSSI

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

7.5.826 Groundwater dependent habitats within Eelmoor Marsh SSSI comprise the NVC plant community M25 *Molinia caerulea-Potentilla erecta* mire (Figure A8.3.19 in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems). However, this habitat is not located within the Order Limits.

i. Groundwater flow interception

7.5.827 The pipeline trench is expected to be located above the water table along the northern boundary of Eelmoor Marsh SSSI. Therefore, the pipeline and back-filled trench would not intercept groundwater supplying GWDTE within Eelmoor Marsh SSSI and there would be no potential for effects to groundwater dependent habitats via this pathway.

ii. Changes to groundwater quality from pipeline leaks

7.5.828 In the unlikely event of pipeline leaks during operation there is a risk to water quality of groundwater on which GWDTE are dependent. This could result in potential effects to GWDTE habitats leading to loss, fragmentation or modification. However, pipeline integrity measures have been embedded into the design to reduce the risk and so the likelihood of leaks is very small. As such, the potential effects resulting



from changes to groundwater quality through this impact pathway would be of negligible magnitude and negligible significance.

Table 7.41: Summary of Potential Impacts on Biodiversity – Eelmoor Marsh SSSI

Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Eelmoor Marsh SSSI	GWDTE – Groundwater flow interception	High	Impact Avoided	
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible

Colony Bog and Bagshot Heath SSSI

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

7.5.829 Groundwater dependent habitats within Colony Bog and Bagshot Heath SSSI, in relation to the Order Limits, comprise valley mire and wet dwarf shrub heath ranging from high to low groundwater dependency (Figures A8.3.25 and A8.3.28 in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems).

i. Groundwater flow interception

7.5.830 Groundwater flow interception could lead to changes in groundwater levels and flows on which the valley mire and wet dwarf shrub heath GWDTE habitats of Colony Bog and Bagshot Heath SSSI are dependent, resulting in potential effects to GWDTE habitats leading to loss, fragmentation or modification.

7.5.831 The pipeline and/or trench through Colony Bog and Bagshot Heath SSSI is likely to be within the unsaturated zone so that groundwater flow interception would not occur. The pipeline is most likely to be below the water table in the area to the north-east of Folly Bog. The groundwater dependent habitats relative to this location comprise wet dwarf shrub heath immediately to the south, with valley mire further to the southwest, and more extensive valley mire to the south, separated from the Order Limits by the watercourse draining Folly Bog (Figure A8.3.28 in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems). This watercourse is a deep artificial watercourse and separates Folly Bog into areas supplied by groundwater flow from the north (from the direction of the Order Limits), and areas supplied by flow from the south, including the main area of valley mire. Potential effects of flow interception by the pipeline and trench in the northeast of Folly Bog would therefore be localised and so would not affect Folly Bog.

7.5.832 Where required, water stops (or “stanks”) would be installed at intervals through the pipe bedding and side fill (O7) to reduce any potential operational groundwater flow effects. With this embedded design in place, the potential effects resulting from groundwater flow interception would be of negligible magnitude of minor significance.

ii. Changes to groundwater quality from pipeline leaks

7.5.833 In the unlikely event of pipeline leaks during operation there is a risk to water quality of groundwater on which GWDTE are dependent. This could result in potential effects to GWDTE habitats leading to loss, fragmentation or modification. However,



pipeline integrity measures have been embedded into the design to reduce this risk. With these measures in place the likelihood of pipeline leaks is very small, and so the potential effects resulting from changes to groundwater quality through this impact pathway would be of negligible magnitude and negligible significance.

Table 7.42: Summary of Potential Impacts on Biodiversity – Colony Bog and Bagshot Heath SSSI

Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Colony Bog and Bagshot Heath SSSI	GWDTE – Groundwater flow interception	High	Negligible	Minor
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible

Chobham Common SSSI

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

7.5.834 Groundwater dependent habitats within Chobham Common SSSI and NNR, in relation to the Order Limits, comprise valley mire and wet dwarf shrub heath of high to moderate to low (Figure A8.3.31 in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems).

i. Groundwater flow interception

7.5.835 As previously described, groundwater flow interception could lead to changes in groundwater levels and flows on which GWDTE are dependent, resulting in potential effects to GWDTE habitats leading to loss, fragmentation or modification.

7.5.836 Trenchless crossing methods are proposed in the central and northeastern parts of the Order Limits (TC024, TC025 and TC026). No open cut is proposed in the areas where wet dwarf shrub heath habitats GWDTE are present. In these areas the pipeline would be at sufficient depth that any changes to groundwater flows supplying GWDTE would be negligible.

7.5.837 In any open cut areas, where required, water stops (or “stanks”) would be installed at intervals through the pipe bedding and side fill (O7) to reduce any potential operational groundwater flow effects resulting in negligible changes.

7.5.838 In summary, the magnitude of potential effects resulting from groundwater flow interception would be of negligible magnitude and minor adverse significance.

ii. Changes to groundwater quality from pipeline leaks

7.5.839 In the unlikely event of pipeline leaks during operation there is a risk to water quality of groundwater on which GWDTE are dependent. This could result in potential effects to GWDTE habitats leading to loss, fragmentation or modification. However, pipeline integrity measures have been embedded into the design to reduce this risk. With these measures in place the likelihood of pipeline leaks is very small, and so the potential effects resulting from changes to groundwater quality through this impact pathway would be of negligible magnitude and negligible significance.

Table 7.43: Summary of Potential Impacts on Biodiversity – Chobham Common SSSI/NNR

Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Chobham Common SSSI/NNR	GWDTE – Groundwater flow interception	High	Negligible	Minor
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible

Dumsey Meadow SSSI

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

7.5.840 The dependency of Dumsey Meadow unimproved MG5 grassland on groundwater has been assessed as ranging as low. Areas of low to moderate dependency on groundwater are located within topographic hollows within the floodplain (Figure A8.3.39 in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment).

i. Groundwater flow interception

7.5.841 The construction method for pipeline near to Dumsey Meadow SSSI would be by trenchless crossing of the River Thames (TC034) (Figure A8.3.37 in Appendix 8.3). The launch area for the crossing would be at a distance of 100m from the Dumsey Meadows SSSI. The River Thames, to the north, also likely forms a hydrogeological barrier between the SSSI and launch area. As the pipeline would be at depth below a very small part (<0.04ha) of the SSSI potential effects of groundwater flow interception within the SSSI would not occur.

ii. Changes to groundwater quality from pipeline leaks

7.5.842 In the unlikely event of pipeline leaks during operation there is a risk to water quality of groundwater on which GWDTE are dependent. This could result in potential effects to GWDTE habitats leading to loss, fragmentation or modification. However, pipeline integrity measures have been embedded into the design to reduce this risk. With these measures in place the likelihood of pipeline leaks is very small, and so the potential effects resulting from changes to groundwater quality through this impact pathway would be of negligible magnitude and negligible significance.

Table 7.44: Summary of Potential Impacts on Biodiversity – Dumsey Meadows SSSI

Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Dumsey Meadows SSSI	GWDTE – Groundwater flow interception	High	Impact Avoided	
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible

Non-statutory Designated Sites

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

7.5.843 Habitats that are dependent on groundwater flows have been identified within nine non-statutory designated sites, as described in Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment:



- Botley Golf Course Woods SINC and Maddoxford Farm Meadows SINC – wet woodland and marshy grassland of high to moderate to low water dependency (Figure A8.3.1 in Appendix 8.3);
- Peck Copse SINC – wet woodland of high groundwater dependency supplied by chalk groundwaters;
- Ewshot Meadows SINC – marshy grassland and wet woodland of moderate to low to moderate groundwater sensitivity (Figure A8.3.14 in Appendix 8.3);
- Cove Brook Grassland SINC and Cove Valley Southern Grassland SINC – wet woodland of low to moderate groundwater dependency (Figure A8.3.21 in Appendix 8.3);
- Blackwater Valley, Frimley Bridge SINC and Frimley Hatches (including Frimley Reedbeds) SNCI – wet woodland and reedbed habitat of moderate to low groundwater dependency (Figure A8.3.23 in Appendix 8.3); and
- Chertsey Meads LNR/SNCI – unimproved grassland, wet woodland and swamp habitats of low groundwater dependency (Figure A8.3.37 in Appendix 8.3); and
- Pannells Farm SNCI – marshy grassland and wet woodland of moderate to low groundwater dependency (Figure A8.3.35 in Appendix 8.3).

Groundwater flow interception

- 7.5.844 The presence of new impermeable infrastructure within, or within groundwater flows of, GWDTEs of the identified non-statutory sites has the potential to impact upon those groundwater flows with subsequent effects on their characteristic and sensitive habitats.
- 7.5.845 The pipeline would be at sufficient depth that any changes to groundwater flows supplying GWDTE of Botley Golf Course Woods SINC and Maddoxford Farm Meadows SINC would be of negligible magnitude (Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment) and negligible significance.
- 7.5.846 Peck Copse SINC is located approximately 30m east of the Order Limits and would be above the groundwater table at most times. However, groundwater levels in the local Chalk geology are expected to fluctuate seasonally and it is possible that the trench would intercept the water table during periods of higher groundwater levels. Given that the springs at Peck Copse SINC are located down gradient of the Order Limits, during periods of high groundwater levels the pipeline trench could intercept groundwater flows supplying the springs within the site, potentially leading to loss, fragmentation or modification of groundwater dependent habitats. However, where required, water stops (or “stanks”) would be installed at intervals through the pipe bedding and side fill (O7). This embedded design would reduce interception of shallow groundwater flows by the pipeline trench during periods of high groundwater levels. The potential effect due to groundwater flow interception would be reduced to negligible magnitude and negligible significance.
- 7.5.847 The back-filled trench for the pipeline at Ewshot Meadows SINC, Cove Brook Grassland SINC, Cove Valley Southern Grassland SINC and Pannells Farm SNCI would be below the water table and could potentially intercept shallow groundwater flows supplying GWDTE habitat around the Order Limits. This could lead to loss,



fragmentation or modification of groundwater dependent habitat. In areas where the pipeline and/or trench are below the water table and where required, water stops (or “stanks”) would be installed at intervals through the pipe bedding and side fill (O7) to reduce flow interception. The potential effect due to groundwater flow interception at these sites would be reduced to negligible magnitude and minor adverse significance.

7.5.848 If the pipeline were constructed across the Blackwater Valley by open cut trench, the back-filled trench and pipeline would likely be below the water table in many areas, particularly the former gravel pits. The trench could intercept shallow groundwater flows supplying GWDTE habitat around the Order Limits, potentially leading to loss, fragmentation or modification of groundwater dependent habitat. However, the groundwater levels across the site are likely to be consistently level, particularly within the former gravel pits, so that groundwater flow gradients are likely to be small and the potential flow lost through the trench is likely to be small. As the area has high groundwater levels any loss of flow due to the pipeline and trench would likely be replenished. As such, the potential effect due to groundwater flow interception would be of negligible magnitude and negligible significance.

Changes to groundwater quality from pipeline leaks

7.5.849 In the unlikely event of pipeline leaks during operation there is a risk to water quality of groundwater on which GWDTE are dependent. This could result in potential effects to GWDTE habitats leading to loss, fragmentation or modification. However, pipeline integrity measures have been embedded into the design to reduce this risk. With these measures in place the likelihood of pipeline leaks is very small, and so the potential effects resulting from changes to groundwater quality through this impact pathway would be of negligible magnitude and negligible significance.

Table 7.45: Summary of Potential Impacts on Biodiversity – Non-Statutory Designated Sites

Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Non-statutory designated sites: Botley Golf Course Woodland SINC; Peck Copse SINC; Blackwater Valley, Frimley Bridge SINC; and Frimley Hatches (including Frimley Reedbeds) SNCI.	GWDTE – Groundwater flow interception	Medium	Negligible	Negligible
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible

Priority Habitats (Outside of Designated Sites)

Hydrological Changes to Groundwater Dependent Terrestrial Ecosystems

7.5.850 The following Priority Habitats have been recorded within or near to the Order Limits and are potentially sensitive to changes to groundwater flows or quality due to the presence of new pipeline infrastructure:

- Coastal and Floodplain Grazing Marsh;
- Purple Moor-grass and Rush Pastures; and
- Wet Woodland.



- 7.5.851 Outside of designated sites, Coastal and Floodplain Grazing Marsh priority habitat is present at the following GWDTE assessment sites (Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment):
- Wintershill (Section A);
 - Caker and Lavant Streams Floodplain (Section C); and
 - Floodplain of River Wey (Section C).
- 7.5.852 Priority Habitat at these locations comprised improved grassland of little intrinsic biodiversity value and not considered to be sensitive to changes in groundwater levels, flows or quality. This potential impact is not discussed further.
- 7.5.853 Outside of designated sites, Purple Moor-grass and Rush Pastures Priority Habitat is present at the following GWDTE assessment sites (Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment):
- Durley Green Lane (Section A); and
 - Foxhills Golf Course (Section F).
- 7.5.854 This habitat at these locations has been identified as having, respectively, moderate and moderate to low dependence on groundwater levels, flows or quality (Figures A8.3.3, A8.3.33 in Appendix 8.3).
- 7.5.855 Outside of designated sites, Wet Woodland priority habitat is present at the following GWDTE assessment sites (Appendix 8.3 Groundwater Dependent Terrestrial Ecosystems Assessment):
- Durley Green Lane (Section A) (outside of Order Limits);
 - Wintershill Floodplain (Section A); and
 - Addlestone Moor (Section G).
- 7.5.856 The groundwater dependence at these locations are of moderate and moderate to low dependency, respectively. Wet Woodland Priority Habitat within the Addlestone Moor GWDTE is partly within and contiguous to Pannells Farm SNCI. The assessment for wet woodland at Addlestone Moor is located within Pannells Farm SNCI and is not repeated here.

Groundwater flow interception

i) Purple Moor-grass and Rush Pastures

- 7.5.857 Within Durley Green Lane, the pipeline and back-filled trench would be below the water table in the area supporting Purple Moor-grass and Rush Pastures Priority Habitat so that groundwater flow interception may occur. This could lead to loss, fragmentation or modification of groundwater dependent habitat. Where required, water stops (or “stanks”) would be installed at intervals through the pipe bedding and side fill (O7) to limit groundwater flow interception. This embedded design would reduce the potential impact to negligible magnitude and negligible significance.



7.5.858 Purple Moor-grass and Rush Pastures Priority Habitat at Foxhills Golf Course is distant from the Order Limits and the trench into which the pipeline would be installed is likely to be above the water table through this site. Therefore, there would be no interception of groundwater flows supplying Purple Moor-grass and Rush Pastures Priority Habitat at this site.

ii) Wet Woodland

7.5.859 Within the identified sites, the back-filled pipeline trench is likely to intercept the water table in the lower-lying parts of the sites. Wet Woodland Priority Habitat at both sites is up-gradient from the Order Limits. As groundwater flows to the sites are likely derived locally from surface run-off and so groundwater flows potentially intercepted by the pipeline would be unlikely to have supplied the areas of Wet Woodland. The potential effect to Wet Woodland at these sites due to groundwater interception is of negligible magnitude and negligible significance.

Changes to groundwater quality from pipeline leaks.

7.5.860 In the unlikely event of pipeline leaks during operation there is a risk to water quality of groundwater on which GWDTE are dependent. This could result in potential effects to GWDTE habitats leading to loss, fragmentation or modification. However, pipeline integrity measures have been embedded into the design to reduce this risk. With these measures in place the likelihood of pipeline leaks is very small, and so the potential effects resulting from changes to groundwater quality through this impact pathway would be of negligible magnitude and negligible significance.

Table 7.46: Summary of Potential Impacts on Biodiversity – Priority Habitats (Outside of Designated Sites)

Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Priority Habitats: Purple Moor-grass and Rush Pastures; and Wet Woodland	GWDTE – Groundwater flow interception	Medium	Negligible	Negligible
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible

Species of Fauna – Bats, Breeding Birds, Fish and Otter

Disturbance

7.5.861 During the operational phase, the only potential sources of disturbance would be associated with lighting and noise from new above ground infrastructure at the proposed new Boorley Green pigging station, and the existing Esso Pumping Station at Alton where an existing pump would be replaced (see Chapter 3 Project Description).

7.5.862 An assessment detailing the potential noise and vibration effects of the project is provided in Appendix 13.3 Noise and Vibration Technical Note. The assessment indicates that the operation of the proposed pump at Alton Pumping Station would not give rise to a negligible magnitude of changes with respect to noise or vibration.



- 7.5.863 The proposed new pigging station at Boorley Green would contain valves, a PIG receiver and a PIG launcher. These facilities are sections of pipework that enable PIGs to enter and exit the main pipeline. As such, they do not contain any machinery or plant or any other moving parts and are not sources of environmental noise or vibration. The movement of PIGs along buried pipelines, and the entry or exit of PIGs at pigging stations, is a quiet activity with no noticeable noise above ground.
- 7.5.864 The pigging station compound would be provided with manually operated lighting for when the station is operated in low light conditions. It would not be permanently lit. No additional lighting is proposed at the existing Alton Pumping Station.
- 7.5.865 With respect to biodiversity, receptors that are potentially sensitive to operational disturbance comprise roosting/commuting/foraging bats, breeding birds, otter and fish. However, for a significant disturbance effect to occur the favourable conservation status of the species would have to be negatively impacted. This is considered highly unlikely given the predicted magnitude of change and the baseline conditions recorded.
- 7.5.866 As such, no disturbance to biodiversity receptors (e.g. roosting bats, breeding birds, fish or otter) are anticipated during the project's operational phase. A negligible magnitude and negligible significance is predicted.

Table 7.47: Summary of Potential Impacts on Biodiversity – Species of Fauna

Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Bats	Disturbance	High	Negligible	Negligible
	Mortality and injury	High	Negligible	Negligible
Breeding birds	Disturbance	Low	Negligible	Negligible
	Mortality and injury	Low	Negligible	Negligible
Fish	Disturbance	Medium/low	Negligible	Negligible
Otter	Disturbance	Medium	Negligible	Negligible

Summary

- 7.5.867 In summary, the potential impacts of the project on ecological receptors are presented in Table 7.48.



Table 7.48: Summary of Potential Impacts on Biodiversity (Without Mitigation)

Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Construction phase				
Solent and Southampton Water SPA and Ramsar, Solent and Dorset Coast pSPA, Solent Maritime SAC and Upper Hamble Estuary and Woods SSSI	Hydrological change – surface water contamination	High	Negligible	Negligible
	Species disturbance	High	Negligible	Negligible
Bourley and Long Valley SSSI (also as component SSSI of Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC)	Habitat loss/gain, fragmentation or modification – notified habitat features and other habitats	High	Small	Minor
	Habitat loss/gain, fragmentation or modification – notable plants	High	Small	Minor
	Habitat loss/gain, fragmentation or modification – notified species – breeding birds	High	Small	Minor
	Habitat loss/gain, fragmentation or modification – notified species – terrestrial invertebrates	High	Negligible	Minor
	Habitat loss/gain, fragmentation or modification – notified species – adder	High	Small	Minor
	Introduction/spread of INNS	High	Negligible	Negligible
	Species mortality/injury – notified species - breeding birds	High	Negligible	Negligible
	Species mortality/injury – notified species – terrestrial invertebrates	High	Small	Minor
	Species mortality/injury – notified species - adder	High	Negligible	Negligible
	Species disturbance – notified species – breeding birds	High	Negligible	Negligible
	Species disturbance – notified species – adder	High	Small	Minor
	GWDTE - Changes to groundwater levels or flows caused by temporary dewatering	High	Small	Minor
	GWDTE – Changes to groundwater quality from chemical or pollutant leaks or spills	High	Negligible	Negligible
	Hydrological change – surface water contamination	High	Negligible	Negligible
	Air quality changes – dust deposition	High	Small	Minor
Basingstoke Canal SSSI	Habitat loss/gain, fragmentation or modification	High	Negligible	Negligible
	Hydrological change – surface water contamination	High	Negligible	Negligible
	Air quality changes – dust deposition	High	Small	Minor



Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Eelmoor Marsh SSSI	Introduction/spread of INNS	High	Negligible	Negligible
	GWDTE - Changes to groundwater levels or flows caused by temporary dewatering	High	Potential Impact Avoided	
	GWDTE – Changes to groundwater quality from chemical or pollutant leaks or spills	High	Negligible	Negligible
	Air quality changes – dust deposition	High	Small	Minor
Colony Bog and Bagshot Heath SSSI (also as component SSSI of Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC)	Habitat loss/gain, fragmentation or modification – notified habitat features and other habitats	High	Small	Minor
	Habitat loss/gain, fragmentation or modification – notable plants	High	Negligible	Minor
	Habitat loss/gain, fragmentation or modification – notified species – breeding birds	High	Small	Minor
	Habitat loss/gain, fragmentation or modification – notified species – terrestrial invertebrates	High	Negligible	Minor
	Introduction/spread of INNS	High	Negligible	Negligible
	Species mortality/injury – notified species – breeding birds	High	Negligible	Negligible
	Species mortality/injury – notified species – terrestrial invertebrates	High	Negligible	Minor
	Species disturbance – notified species – breeding birds	High	Negligible	Negligible
	GWDTE - Changes to groundwater levels or flows caused by temporary dewatering	High	Negligible	Minor
	GWDTE – Changes to groundwater quality from chemical or pollutant leaks or spills	High	Negligible	Negligible
Air quality changes – dust deposition	High	Small	Minor	
Chobham Common SSSI and NNR (also as component SSSI of Thames Basin Heaths SPA and Thursley, Ash, Pirbright and Chobham SAC)	Habitat loss/gain, fragmentation or modification – notified habitat features and other habitats	High	Small	Minor
	Habitat loss/gain, fragmentation or modification – notable plants and vascular plant assemblage	High	Negligible	Minor
	Habitat loss/gain, fragmentation or modification – notified species – breeding birds	High	Negligible	Minor
	Habitat loss/gain, fragmentation or modification – notified species – terrestrial invertebrates	High	Negligible	Minor
	Introduction/spread of INNS	High	Negligible	Negligible
	Species mortality/injury – notified species – breeding birds	High	Negligible	Negligible
	Species mortality/injury – notified species – terrestrial invertebrates	High	Negligible	Minor
	Species disturbance – notified species – breeding birds	High	Negligible	Negligible
	GWDTE - Changes to groundwater levels or flows caused by temporary dewatering	High	Negligible	Negligible



Ecological Receptor	Potential Impact	Value	Magnitude	Significance
	GWDTE – Changes to groundwater quality from chemical or pollutant leaks or spills	High	Negligible	Negligible
	Hydrological change – surface water contamination	High	Negligible	Negligible
	Air quality changes – dust deposition	High	Small	Minor
Dumsey Meadow SSSI	Habitat loss/gain, fragmentation or modification	High	Negligible	Negligible
	Introduction/spread of INNS	High	Negligible	Negligible
	GWDTE - Changes to groundwater levels or flows caused by temporary dewatering	High	Potential Impact Avoided	
	GWDTE – Changes to groundwater quality from chemical or pollutant leaks or spills	High	Potential Impact Avoided	
	Air quality changes – dust deposition	High	Potential Impact Avoided	
Staines Moor SSSI and South West London Waterbodies SPA, Ramsar	Species disturbance	High	Negligible	Negligible
	Hydrological change – surface water contamination	High	Negligible	Negligible
Ancient Woodland Inventory site	Habitat loss/gain, fragmentation or modification	High	Potential Impact Avoided	
	Air quality changes – dust deposition	High	Small	Minor
	Introduction/spread of INNS	High	Negligible	Negligible
Potential Ancient Woodland Sites (less than 2ha)	Habitat loss/gain, fragmentation or modification	High	Negligible	Negligible
	Air quality changes – dust deposition	High	Small	Minor
	Introduction/spread of INNS	High	Negligible	Negligible
Chertsey Meads LNR/SNCI	Habitat loss/gain, fragmentation or modification	High	Small	Minor
	Air quality changes – dust deposition	High	Small	Minor
	GWDTE - Changes to groundwater levels or flows caused by temporary dewatering	High	Negligible	Negligible
	GWDTE – Changes to groundwater quality from chemical or pollutant leaks or spills	High	Negligible	Negligible
	Introduction/spread of INNS	High	Negligible	Negligible
Water Lane SINC	Habitat loss/gain, fragmentation or modification	High	Negligible	Minor
	Air quality changes – dust deposition	High	Small	Minor
	Introduction/spread of INNS	High	Negligible	Negligible
	Habitat loss/gain, fragmentation or modification	High	Small	Minor



Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Brockwood Copse and Roadside Strips SINC	Air quality changes – dust deposition	High	Small	Minor
	Introduction/spread of INNS	High	Negligible	Negligible
All other non-statutory designated sites (worst case scenario presented)	Habitat loss/gain, fragmentation or modification	Medium	Small	Minor
	GWDTE - Changes to groundwater levels or flows caused by temporary dewatering	Medium	Negligible	Minor
	GWDTE – Changes to groundwater quality from chemical or pollutant leaks or spills	Medium	Negligible	Negligible
	Hydrological change – surface water contamination	Medium	Negligible	Negligible
	Air quality changes – dust deposition	Medium	Small	Minor
	Introduction/spread of INNS	Medium	Negligible	Negligible
	Species disturbance	Medium	Small	Minor
Priority habitats	Habitat loss/gain, fragmentation or modification	Medium	Small	Minor
	GWDTE - Changes to groundwater levels or flows caused by temporary dewatering	Medium	Negligible	Negligible
	GWDTE – Changes to groundwater quality from chemical or pollutant leaks or spills	Medium	Negligible	Negligible
	Air quality changes – dust deposition	Medium	Small	Minor
	Introduction/spread of INNS	Medium	Negligible	Negligible
Notable plant species	Habitat loss/gain, fragmentation or modification	Low	Small	Minor
Aquatic macroinvertebrates	Mortality and injury	Low	Negligible	Negligible
	Habitat loss/gain, fragmentation or modification	Low	Small	Minor
	Hydrological change during open cut across watercourses	Low	Negligible	Negligible
	Hydrological change – surface water contamination	Low	Negligible	Negligible
Bats	Mortality and injury	High	Negligible	Negligible
	Habitat loss/gain, fragmentation or modification	High	Small	Minor
	Disturbance	High	Negligible	Minor
Breeding birds	Mortality and injury	Low	Negligible	Negligible
	Habitat loss/gain, fragmentation or modification	Low	Small	Minor
	Disturbance	Low	Small	Minor
Dormouse	Mortality and injury	Medium	Negligible	Negligible



Ecological Receptor	Potential Impact	Value	Magnitude	Significance
	Habitat loss/gain, fragmentation or modification	Medium	Small	Minor
	Disturbance	Medium	Small	Minor
Fish	Mortality and injury	Medium/low	Negligible	Negligible
	Habitat loss/gain, fragmentation or modification	Medium/low	Small	Minor
	Disturbance	Medium/low	Small	Minor
Great crested newt	Mortality and injury	Medium	Negligible	Negligible
	Habitat loss/gain, fragmentation or modification	Medium	Small	Minor
Rare reptiles	Mortality and injury	High	Negligible	Negligible
	Habitat loss/gain, fragmentation or modification	High	Small	Minor
	Disturbance	High	Negligible	Minor
Common reptiles	Mortality and injury	Low	Negligible	Negligible
	Habitat loss/gain, fragmentation or modification	Low	Negligible	Minor
	Disturbance	Low	Negligible	Negligible
Otter	Mortality and injury	Medium	Negligible	Negligible
	Habitat loss/gain, fragmentation or modification	Medium	Negligible	Minor
	Disturbance	Medium	Negligible	Minor
Water vole	Mortality and injury	High	Negligible	Negligible
	Habitat loss/gain, fragmentation or modification	High	Negligible	Minor
	Disturbance	High	Negligible	Minor
Operational phase				
Bourley and Long Valley SSSI	GWDTE – Groundwater flow interception	High	Negligible	Negligible
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible
Eelmoor Marsh SSSI	GWDTE – Groundwater flow interception	High	Impact Avoided	
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible
Colony Bog and Bagshot Heath SSSI	GWDTE – Groundwater flow interception	High	Negligible	Minor
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible



Ecological Receptor	Potential Impact	Value	Magnitude	Significance
Chobham Common SSSI/NNR	GWDTE – Groundwater flow interception	High	Negligible	Minor
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible
	Mortality and injury – breeding birds	High	Negligible	Minor
Dumsey Meadows SSSI	GWDTE – Groundwater flow interception	High	Impact Avoided	
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible
Non-statutory designated sites: Ewshot Meadows SINC; Cove Brook Grassland SINC; Cove Valley Southern Grassland SINC; and Pannells Farm SNCI.	GWDTE – Groundwater flow interception	Medium	Negligible	Minor
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible
Non-statutory designated sites: Botley Golf Course Woodland SINC; Peck Copse SINC; Blackwater Valley, Frimley Bridge SINC; and Frimley Hatches (including Frimley Reedbeds) SNCI.	GWDTE – Groundwater flow interception	Medium	Negligible	Negligible
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible
Priority Habitats: Purple Moor-grass and Rush Pastures; and Wet Woodland	GWDTE – Groundwater flow interception	Medium	Negligible	Negligible
	GWDTE – Changes to groundwater quality from pipeline leaks	High	Negligible	Negligible
Bats	Disturbance	High	Negligible	Negligible
Breeding birds	Disturbance	Low	Negligible	Negligible
Fish	Disturbance	Medium/low	Negligible	Negligible
Otter	Disturbance	Medium	Negligible	Negligible



7.6 Mitigation

Construction Mitigation

- 7.6.1 No significant effects on biodiversity or specific ecological receptors were identified with the implementation of embedded and good practice measures. No additional construction mitigation is therefore proposed.

Operational Mitigation

- 7.6.2 No potentially significant effects on ecological receptors have been identified during operation of the project. No additional operational mitigation is therefore proposed.

Monitoring

- 7.6.3 A three-year aftercare period would be established for all mitigation planting and reinstatement (G92).
- 7.6.4 A programme of post-construction monitoring and objectives/targets for designated ecological sites, would be agreed and implemented in accordance with DCO requirements (G47).

7.7 Residual Impacts (With Mitigation)

- 7.7.1 Residual impacts are those that are predicted to remain once the mitigation measures described in this ES have been implemented.

Construction

- 7.7.2 No significant residual construction impacts are predicted.

Operation

- 7.7.3 No significant residual operational impacts are predicted.

7.8 References

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