

## Appendix D. Planning Inspectorate DCO screening matrices

Table D.1: HRA Screening Matrix for Solent and Southampton Water SPA (based on that set out in Planning Inspectorate Advice Note Ten (2017))

**Matrix key**

✓ = Likely significant effect cannot be excluded ✗ = Likely significant effect can be excluded

C = construction O = operation D = decommissioning

B = Breeding W = Wintering P = on Passage

Solent and Southampton Water Special Protection Area (SPA)																		
EU Code: UK9011061																		
Distance to NSIP – The Order Limits are located, at their closest point, approximately 1.85km from the SPA boundary. A hydrological link to the SPA is established where the Order Limits cross two small tributaries of the River Hamble: A Main River known as Ford Lake at SU 51575 14739 near Boorley Green approximately 2.2km due northwest and upstream of the SPA; and, an unnamed Ordinary Watercourse at SU 53575 17990 in Wintershill, approximately 6km NNE and upstream of the SPA.																		
European site features									Likely effects of NSIP									
Effect	Physical disturbance			Non-physical disturbance			Hydrological changes			Air quality changes			Ground contamination			In-combination effects		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Stage of development																		
Common tern ( <i>Sterna hirundo</i> ) B							✗e	✗f		✗g	✗g		✗h	✗f		✗i	✗i	
Little tern ( <i>Sterna albifrons</i> ) B							✗e	✗f		✗g	✗g		✗h	✗f		✗i	✗i	
Mediterranean gull ( <i>Larus melanocephalus</i> ) B							✗e	✗f		✗g	✗g		✗h	✗f		✗i	✗i	
Roseate tern ( <i>Sterna dougalli</i> ) B							✗e	✗f		✗g	✗g		✗h	✗f		✗i	✗i	
Sandwich Tern ( <i>Sterna sandvicensis</i> ) B							✗e	✗f		✗g	✗g		✗h	✗f		✗i	✗i	
Black-tailed godwit ( <i>Limosa limosa islandica</i> ) W							✗e	✗f		✗g	✗g		✗h	✗f		✗i	✗i	
Dark-bellied brent goose ( <i>Branta bernicla bernicla</i> ) W	✗a	✗b		✗c	✗d		✗e	✗f		✗g	✗g		✗h	✗f		✗i	✗i	
Teal ( <i>Anas crecca</i> ) W							✗e	✗f		✗g	✗g		✗h	✗f		✗i	✗i	
Ringed plover ( <i>Charadrius hiaticula</i> ) W							✗e	✗f		✗g	✗g		✗h	✗f		✗i	✗i	
Water bird assemblage W	✗a	✗b		✗c	✗d		✗e	✗f		✗g	✗g		✗h	✗f		✗i	✗i	
Over winter, the area regularly supports 53,948 individual waterfowl (five-year peak mean 1991/2 - 1995/6) including: gadwall ( <i>Anas strepera</i> ), teal, ringed plover, black-tailed godwit, little grebe ( <i>Tachybaptus ruficollis</i> ), great crested grebe ( <i>Podiceps cristatus</i> ), cormorant ( <i>Phalacrocorax carbo</i> ), dark-bellied brent goose, wigeon ( <i>Anas penelope</i> ), redshank ( <i>Tringa totanus</i> ), pintail ( <i>Anas acuta</i> ), shoveler ( <i>Anas clypeata</i> ), red-breasted merganser ( <i>Mergus serrator</i> ), grey plover ( <i>Pluvialis squatarola</i> ), lapwing ( <i>Vanellus vanellus</i> ), dunlin ( <i>Calidris alpina alpina</i> ), curlew ( <i>Numenius arquata</i> ), shelduck ( <i>Tadorna tadorna</i> ).																		

a. **Physical disturbance (construction)** – To construct the project, terrestrial habitat would need to be temporarily destroyed or damaged by digging the pipeline trench and topsoil stripping. As the route would not interact directly with the SPA, any effect to qualifying species due to habitat loss could only result where the project would potentially damage or destroy suitable foraging, roosting or breeding habitat outside the European site. There are arable fields, agricultural and other grassland habitats within the Order Limits. Although the SPA supports predominantly coastal and freshwater wetlands and marine habitats, the following qualifying species of the SPA use inland terrestrial habitats for foraging and roosting during the winter: dark-bellied brent goose, lapwing, grey plover and curlew; e.g. brent geese utilise cereal fields close to the coast, and species such as lapwing and curlew disperse more widely to use farmland habitats. There could therefore be the potential for effects to qualifying species of the SPA due to temporary loss of these habitats.

The core and potential roosting and foraging zones of qualifying species of the SPA have been mapped by the Solent Waders and Brent Goose Strategy (Solent Waders and Brent Goose Strategy, 2017). The Order Limits fall outside these zones. Suitable habitat such as arable fields are abundant in the landscape outside the Order Limits. As such, any qualifying species of the SPA potentially displaced by project activities would likely readily find suitable resource nearby without detriment to SPA populations. The project requires no permanent land-take (with the exception of minor land-take for valves and a new pigging station near Boorley Green). Where possible, reinstatement of vegetation would be using the same or similar species to that removed (subject to restrictions for pipeline over and around pipeline easements) (G88). As the potential wintering habitats of qualifying species of the SPA along the route (e.g. arable fields) are readily restored, it is therefore considered very unlikely that there would be any significant long-term effect of habitat loss to qualifying species of the SPA as a result of the project that could lead to LSE.

Any other indirect disturbance pathways, such as visual disturbance due to changes to landscape structure during construction that would be visible from the air during migration, are also likely to be insignificant due to the small scale and temporary nature of the project in the context of the wider landscape. The project is not considered likely to generate noise and visual disturbance to bird interest features present in habitats outside the SPA that would lead to LSE.

- b. Physical disturbance (operation)** – During operation, the pipeline would be buried in the ground. It is feasible that emergency repairs to the buried pipeline, once in operation, could be necessary involving the excavation and repair activities within the pipeline easement. These operations would be rare and highly localised. Further specifics on the operation of the replacement pipeline are provided in section 3.5 of ES Chapter 3. Given the nature and frequency of these activities and the distance from the project to the SPA, no significant habitat impacts, or associated disturbance would arise during the operational phase of the project.
- c. Non-physical disturbance (construction)** – For the duration of construction of the project there would be changes to noise and visual stimuli generated by movement of plant and personnel within the construction area, excavation and other groundworks, and transport. Anthropogenic noise and visual changes have well-documented disturbance effects on bird species, resulting in both behavioural and population changes (Latimer *et al.*, 2003). The potential impacts of noise and visual disturbance to the bird interest features of the SPA due to the project are therefore to be considered.

There is no current authoritative guidance on how far a noise study area should extend from construction activities due to the variability of the potential noise generating activities and plant used. However, based on professional judgement, the effects of noise (as well as visual/human presence) are only likely to be significant where the 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.

Given the above, the project is considered sufficiently distant from the SPA (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 etc.) that noise disturbance is unlikely to have any effect on bird interest features of the site. Similarly, at such a distance visual disturbance to the SPA would not be expected to result from project activities.

Outside the SPA, the Order Limits and adjacent landscape supports arable fields, agricultural and other grassland habitats, as well as human conurbations. Although the SPA supports predominantly coastal and freshwater wetlands and marine habitats, the following qualifying species of the SPA use terrestrial inland habitats for foraging and roosting during the winter: brent goose, lapwing, grey plover and curlew; e.g. brent geese utilise cereal fields close to the coast and species such as lapwing disperse more widely to use farmland habitats. There could therefore, be the potential for disturbance to arise to qualifying species of the SPA using such habitats.

The core and potential roosting and foraging zones of qualifying species of the SPA have been mapped by the Solent Waders and Brent Goose Strategy (Solent Waders and Brent Goose Strategy, 2017). The Order Limits fall outside these zones. Any effect of disturbance, therefore, would likely be *de minimis*. Moreover, suitable habitat such as arable fields are abundant in the landscape around the route. As such, any qualifying species of the SPA present outside these zones that may be temporarily displaced for the duration of the project would likely find suitable alternative resource nearby without detriment to SPA populations.

Any other indirect disturbance pathways, such as visual disturbance due to changes to landscape structure during construction that would be visible from the air during migration, are likely to be insignificant due to the small scale and temporary nature of the project in the context of the wider landscape. The project is therefore not considered likely to generate noise and visual disturbance to qualifying species of the SPA present outside the SPA that would lead to LSE.

- d. Non-physical disturbance (operation)** – During operation, the pipeline would be buried in the ground. It is feasible that emergency repairs to the buried pipeline, once in operation, could be necessary involving the excavation and repair activities within the pipeline easement. These operations would be rare and highly localised. Further specifics on the operation of the replacement pipeline are provided in section 3.5 of ES Chapter 3. Given the nature and frequency of these activities and the distance to the SPA, no significant disturbance due to changes in the audio-visual baseline would arise during the operational phase of the project. No LSE are anticipated.
- e. Hydrology (water quality changes) (construction)** – The project has low potential to generate minor emissions to ground and surface water bodies during construction activities (accidental spillages, silting etc.) and operation of the pipeline (leaks). As the route crosses tributaries of the River Hamble upstream of the SPA, there is a theoretical pathway for effects to occur to the SPA, which could cause destruction or damage of habitats supporting qualifying species. However, the two watercourses that would be crossed by the route are very small in comparison to the large freshwater and estuarine systems that comprise the SPA and which supports the qualifying species of the site, and there would be a large distance between the SPA and any point of discharge of contaminants to these watercourses.

The construction of the project across the tributary of the River Hamble at Ford Lake by trenchless techniques would further reduce the low risk of surface water contamination as machinery would be working at distance from the watercourse. Directional drilling at this location is proposed for construction reasons and not because there is a theoretical pathway for effects to the SPA, and therefore does not constitute mitigation to avoid or reduce effects to the SPA.

Moreover, the risk of pollution events occurring during construction are considered to be extremely low because potential sources of contamination (e.g. vehicles, plant or fuel) would typically not come into contact with the water environment. During open-trenching across watercourses, a flume pipe (or pipes) would be installed into the bed of the watercourse, sized to allow the flow of the watercourse through it during the works. The watercourse would be dammed at each end of the flume to form a dry area in between. This would create a temporarily culverted section of the watercourse in the area of the crossing. A vehicle haul road would be constructed over one half of the flume. A trench would then be excavated under the other half of the flume and the pipe installed at least 1m below the true cleaned bottom of the watercourse/ditch. Concrete protection slabs would be installed above the pipeline as additional protection from future watercourse dredging/cleaning works. Once the watercourse bed and banks are reinstated and all works complete, the flume will be removed allowing the watercourse to flow naturally.

Given the above, the risk of changes to water quality and potential contamination of the SPA during construction of the project is considered to be extremely low and no LSE are anticipated.

- f. Hydrology (water quality changes) and ground contamination (operation)** – The risk of changes to water quality, or ground contamination during operation is considered to be extremely low. The principles of inherent safe design have been incorporated into the design of the pipeline as per Esso design standards for fuel pipelines, relevant industry codes of practice and standards and the requirements of the Pipeline Safety Regulations 1996 (O8). Key principles of the design include a design life of 60 years; protection against corrosion; necessary equipment required for pipeline inspection; inclusion of remotely operated valves to allow isolation of sections of the pipeline if required (O9); and 24-hour remote monitoring of pipeline operation to detect leaks and enable remote shut down of the pipeline if required (O10). As such, the risk of contamination of the SPA during the operational phase of the project is considered to be extremely low and no LSE are anticipated.
- g. Air quality changes (construction and operation)** – The SPA is beyond the zone of influence within which emissions or fugitive dust from the construction are likely to have a significant impact on the habitats supporting qualifying species of the SPA (Highways Agency, 2007; IAQM, 2014). The risk of loss of habitat supporting qualifying species of SPA due to contamination from air emissions is considered to be very low. No LSE are anticipated.
- h. Ground contamination (construction)** – The accidental release of hazardous chemicals on site during construction works as a result of equipment failure or human error could result in soil contamination and impacts on the local environment. There is a theoretical pathway for effects to qualifying species of the SPA that use inland terrestrial habitats for foraging due to a loss, or degradation of supporting habitats due to contamination. The route would not interact directly with the SPA. That effects could only result where the project would potentially damage or destroy suitable foraging, roosting or breeding habitat outside the European site substantially weakens the nature of the pathway to significant effects. As the Order Limits



fall outside core and potential roosting and foraging zones of qualifying species of the SPA as mapped by the Solent Waders and Brent Goose Strategy (Solent Waders and Brent Goose Strategy, 2017) and in light of the scale (and associated plant) and temporary duration of the works that would not permit a pervasive, or large-scale contamination event, LSE are not predicted.

- i. **In combination** – An in-combination assessment has been undertaken and is presented in Appendix E. No in-combination effects are anticipated.

**Table D.2: HRA Screening Matrix for Solent and Dorset Coast potential Special Protection Area (based on that set out in Planning Inspectorate Advice Note Ten (2017))**

**Matrix key**

✓ = Likely significant effect cannot be excluded ✗ = Likely significant effect can be excluded

C = construction O = operation D = decommissioning

B = Breeding W = Wintering P = on Passage

Solent and Dorset Coast potential Special Protection Area (pSPA)												
EU code: awaiting decision												
Distance to NSIP – This site, encompassing an area of approximately 259.7m <sup>2</sup> (89,078.02ha), is proposed to protect important foraging areas at sea for birds already protected in nearby SPAs. The site protects areas at sea and follows the coastline on either side to the Isle of Wight and into Southampton Water. To a degree there is an overlap with the boundaries of the Solent and Southampton Water SPA/Ramsar. As with the Solent and Southampton Water SPA/Ramsar, the Order Limits are located, at their closest point, approximately 1.85km from the pSPA boundary. A hydrological link to the pSPA is established where the Order Limits cross two small tributaries of the River Hamble: A Main River known as Ford Lake at SU 51575 14739 near Boorley Green approximately 2.2km due northwest and upstream of the pSPA; and, an unnamed Ordinary Watercourse at SU 53575 17990 in Wintershill, approximately 6km NNE and upstream of the pSPA.												
Effect	European site features			Likely effects of NSIP								
	Physical disturbance			Non-physical disturbance			Hydrological changes			In-combination effects		
Stage of development	C	O	D	C	O	D	C	O	D	C	O	D
Common tern ( <i>Sterna hirundo</i> ) B	✗a			✗b			✗c	✗d		✗e	✗e	
Little tern ( <i>Sterna albifrons</i> ) B	✗a			✗b			✗c	✗d		✗e	✗e	
Sandwich Tern ( <i>Sterna sandvicensis</i> ) B	✗a			✗b			✗c	✗d		✗e	✗e	

- Physical disturbance (construction and operation)** – This site is proposed to protect important foraging areas exclusively at sea used by qualifying interest features from colonies within adjacent, already classified SPAs. No pathway to effects due to ground disturbance has been identified.
- Non-physical disturbance (construction)** – The proposed boundaries of this pSPA are based on usage patterns of the qualifying species around breeding colony SPAs. On the basis the areas of principal importance are captured within the site boundary and given the lack of interaction between this boundary and the project's likely ZoI for anthropogenic noise and visual changes (<1.85km), no LSE are anticipated.
- Hydrology (water quality changes) (construction)** – The project has low potential to generate minor emissions to ground and surface water bodies during construction activities (accidental spillages, silting etc.) and operation of the pipeline (leaks). As the route crosses tributaries of the River Hamble upstream of the pSPA, there is a theoretical pathway for effects to occur to the pSPA, which could cause destruction or damage of habitats supporting qualifying species. However, the two watercourses that would be crossed by the route are very small in comparison to the large marine and estuarine systems that comprise the pSPA and which supports the qualifying species of the site, and there would be a large distance between the pSPA and any point of discharge of contaminants to these watercourses.

The construction of the project across the tributary of the River Hamble at Ford Lake by trenchless techniques would further reduce the low risk of surface water contamination as machinery would be working at distance from the watercourse. Directional drilling at this location is proposed for construction reasons and not because there is a theoretical pathway for effects to the pSPA, and therefore does not constitute mitigation to avoid or reduce effects to the pSPA.

Moreover, the risk of pollution events occurring during construction are considered to be extremely low because potential sources of contamination (e.g. vehicles, plant or fuel) would typically not come into contact with the water environment. During open-trenching across watercourses, a flume pipe (or pipes) would be installed into the bed of the watercourse, sized to allow the flow of the watercourse through it during the works. The watercourse would be dammed at each end of the flume to form a dry area in between. This would create a temporarily culverted section of the watercourse in the area of the crossing. A vehicle haul road would be constructed over one half of the flume. A trench would then be excavated under the other half of the flume and the pipe installed at least 1m below the true cleaned bottom of the watercourse/ditch. Concrete protection slabs would be installed above the pipeline as additional protection from future watercourse dredging/cleaning works. Once the watercourse bed and banks are reinstated and all works complete, the flume will be removed allowing the watercourse to flow naturally.

Given the above, the risk of changes to water quality and potential contamination of the pSPA during construction of the project is considered to be extremely low and no LSE are anticipated.

- Hydrological changes (water quality) (operation)** – The risk of changes to water quality during operation is considered to be extremely low. The principles of inherent safe design have been incorporated into the design of the pipeline as per Esso design standards for fuel pipelines, relevant industry codes of practice and standards and the requirements of the Pipeline Safety Regulations 1996 (O8). Key principles of the design include a design life of 60 years; protection against corrosion; necessary equipment required for pipeline inspection; Inclusion of remotely operated valves to allow isolation of sections of the pipeline if required (O9); and 24-hour remote monitoring of pipeline operation to detect leaks and enable remote shut down of the pipeline if required (O10). As such, the risk of contamination of the pSPA during the operational phase of the project is considered to be extremely low and no LSE are anticipated.
- In combination** – An in-combination assessment has been undertaken and is presented in Appendix E. No in-combination effects are anticipated.

Table D.3: HRA screening matrix for Solent Maritime SAC (based on that set out in Planning Inspectorate Advice Note Ten (2017))

Matrix key

✓ = Likely significant effect cannot be excluded ✗ = Likely significant effect can be excluded

C = construction O = operation D = decommissioning

Solent Maritime Special Area of Conservation (SAC)															
EU Code: UK0030059															
Distance to NSIP – The Order Limits are located, at their closest point, approximately 1.85km from the SAC boundary. A hydrological link to the SAC is established where the route crosses two small tributaries of the River Hamble: A Main River known as Ford Lake at SU 51575 14739 near Boorley Green approximately 2.2km due northwest and upstream of the SPA; and, an unnamed Ordinary Watercourse at SU 53575 17990 in Wintershill, approximately 6km NNE and upstream of the SPA.															
Effect	Physical disturbance			Non-physical disturbance			Hydrological changes			Air quality changes			In-combination effects		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Stage of development															
1130 Estuaries							✗a	✗b		✗c			✗d	✗d	
1320 <i>Spartina</i> swards ( <i>Spartinion maritimae</i> )							✗a	✗b		✗c			✗d	✗d	
1330 Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )							✗a	✗b		✗c			✗d	✗d	
1110 Sandbanks which are slightly covered by sea water all the time							✗a	✗b		✗c			✗d	✗d	
1140 Mudflats and sandflats not covered by seawater at low tide							✗a	✗b		✗c			✗d	✗d	
1150 Coastal lagoons* Priority feature							✗a	✗b		✗c			✗d	✗d	
1210 Annual vegetation of drift lines							✗a	✗b		✗c			✗d	✗d	
1220 Perennial vegetation of stony banks							✗a	✗b		✗c			✗d	✗d	
1310 <i>Salicornia</i> and other annuals colonising mud and sand							✗a	✗b		✗c			✗d	✗d	
2120 'Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes')							✗a	✗b		✗c			✗d	✗d	
Desmoulin's whorl snail ( <i>Vertigo moulinsiana</i> )							✗a	✗b		✗c			✗d	✗d	

a. **Hydrological changes (construction)** – Emissions could be generated during construction by spillages of fuels or leaking construction plant, or by uncontrolled silting of waterbodies or the discharge of nutrient-enriched runoff during excavations. The functional link between the SAC and the project comprises the two small tributaries of the River Hamble that would be crossed during construction. As the qualifying habitats and species of the SAC are dependent upon hydrological, geomorphological and/or marine processes (flooding of grazing marshes, tidal and fluvial dynamics etc.) that operate over a much larger scale than that of the project (the SAC itself has an area of 11,243.12ha), any hydrological modifications to the watercourses should they occur as a result of the project are considered not likely to have a significant effect on the features of the SAC.

The project has very low potential to generate minor emissions to ground and surface water bodies during construction activities (accidental spillages, silting etc.). As the route crosses tributaries of the River Hamble upstream of the SAC, there is a theoretical pathway for effects to occur to the SAC. This could cause destruction or damage of qualifying habitats and habitats supporting qualifying species of the SAC. However, the two watercourses that would be crossed by the route are very small in comparison to the large freshwater and estuarine systems that comprise the SAC and which supports the qualifying habitats and habitat supporting the qualifying species of the site. There would also be a large distance between the SAC and any point of discharge of contaminants to these watercourses.

A trenchless crossing (TC001) would be used at Ford Lake Stream and so disruption to the stream and its habitats would be avoided. This would further reduce the low risk of surface water contamination as machinery would be working at distance from the watercourse. The use of trenchless techniques at this location is proposed for construction reasons and not because there is a theoretical pathway for effects to the SAC, and therefore does not constitute mitigation to avoid or reduce effects to the SAC. Moreover, the risk of pollution events occurring during construction are considered to be extremely low because potential sources of contamination (e.g. vehicles, plant or fuel) would typically not come into contact with the water environment. Given the above, the risk contamination of the SAC during construction of the project is considered to be extremely low and no LSE are anticipated.

b. **Hydrological changes (operation)** – The risk of operational contamination to watercourses is considered to be extremely low. The principles of inherent safe design have been incorporated into the design of the pipeline as per Esso design standards for fuel pipelines, relevant industry codes of practice and standards and the requirements of the Pipeline Safety Regulations 1996 (O8). Key principles of the design include a design life of 60 years; protection against corrosion; necessary



equipment required for pipeline inspection; inclusion of remotely operated valves to allow isolation of sections of the pipeline if required (O9); and 24-hour remote monitoring of pipeline operation to detect leaks and enable remote shut down of the pipeline if required (O10). As such, the risk of contamination of the SAC during the operational phase of the project is considered to be extremely low and no LSE are anticipated.

- c. **Air quality changes (construction)** – The construction works for the project would require plant and machinery that have the potential to generate dust and local emissions to air. As the SAC is beyond the 200m zone of influence within which emissions or fugitive dust from the project construction are likely to have a significant impact on the qualifying habitats or habitats supporting qualifying species of the SAC (Highways Agency, 2007; IAQM, 2014), no LSE are anticipated.
- d. **In combination** – An in-combination assessment has been undertaken and is presented in Appendix E. No in-combination effects are anticipated.

Table D.4: HRA screening matrix for Solent and Southampton Water Ramsar site (based on that set out in Planning Inspectorate Advice Note Ten (2017))

Matrix key

✓ = Likely significant effect cannot be excluded ✕ = Likely significant effect can be excluded

C = construction O = operation D = decommissioning

B = Species with peak counts in spring/autumn W = Species with peak counts in winter

Solent and Southampton Water Ramsar site																		
EU Code: UK11063																		
Distance to NSIP – The Order Limits are located, at their closest point, approximately 1.85km from the Ramsar site boundary. A hydrological link to the site is established where the route crosses two small tributaries of the River Hamble: A Main River known as Ford Lake at SU 51575 14739 near Boorley Green approximately 2.2km due northwest and upstream of the Ramsar site; and, an unnamed Ordinary Watercourse at SU 53575 17990 in Wintershill, approximately 6km NNE and upstream of the Ramsar site.																		
Effect	Likely effects of NSIP																	
	Physical disturbance			Non-physical disturbance			Hydrological changes			Air quality changes			Ground contamination			In-combination effects		
Stage of development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
<b>Ramsar criterion 1</b> The site is one of the few major sheltered channels between a substantial island and mainland in European waters, exhibiting an unusual strong double tidal flow and has long periods of slack water at high and low tide. It includes many wetland habitats characteristic of the biogeographic region: saline lagoons, saltmarshes, estuaries, intertidal flats, shallow coastal waters, grazing marshes, reedbeds, coastal woodland and rocky boulder reefs.				✕c	✕d		✕e	✕f		✕g			✕h	✕f		✕i	✕i	
<b>Ramsar criterion 2</b> The site supports an important assemblage of rare plants and invertebrates.	✕a	✕b		✕c	✕d		✕e	✕f		✕g			✕h	✕f		✕i	✕i	
<b>Ramsar criterion 5</b> Assemblages of international importance: Species with peak counts in winter: 51,343 waterfowl (five-year peak mean 1998/99-2002/2003)	✕a	✕b		✕c	✕d		✕e	✕f		✕g			✕h	✕f		✕i	✕i	
<b>Ramsar criterion 6 – species/populations occurring at levels of international importance</b> Ringed plover ( <i>Charadrius hiaticula</i> ), 397 individuals, representing an average of 1.2% of the GB population (five-year peak mean 1998/9- 2002/3) B	✕a	✕b		✕c	✕d		✕e	✕f		✕g			✕h	✕f		✕i	✕i	
<b>Ramsar criterion 6 – species/populations occurring at levels of international importance</b> Black-tailed godwit ( <i>Limosa limosa islandica</i> ), 1,240 individuals, representing an average of 3.5% of the population (five-year peak mean 1998/9-2002/3) W	✕a	✕b		✕c	✕d		✕e	✕f		✕g			✕h	✕f		✕i	✕i	
<b>Ramsar criterion 6 – species/populations occurring at levels of international importance</b> Dark-bellied brent goose, ( <i>Branta bernicla bernicla</i> ), 6,456 individuals, representing an average of 3% of the population (five-year peak mean 1998/9- 2002/3) W	✕a	✕b		✕c	✕d		✕e	✕f		✕g			✕h	✕f		✕i	✕i	
<b>Ramsar criterion 6 – species/populations occurring at levels of international importance</b> Teal ( <i>Anas crecca</i> ), 5,514 individuals, representing an average of 1.3% of the population (five-year peak mean 1998/9-2002/3) W	✕a	✕b		✕c	✕d		✕e	✕f		✕g			✕h	✕f		✕i	✕i	

a. **Physical disturbance (construction)** – To construct the project, terrestrial habitat would need to be temporarily destroyed or damaged by digging the pipeline trench and topsoil stripping. As the route would not interact directly with the Ramsar site, any effect to qualifying species due to habitat loss could only result where the project would potentially damage or destroy suitable foraging, roosting or breeding habitat outside the European site. The route supports arable fields, agricultural and other grassland habitats. Although the Ramsar site supports predominantly coastal and freshwater wetlands and marine habitats, some qualifying species of the site use inland terrestrial habitats for foraging and roosting during the winter e.g. brent geese utilise cereal fields close to the coast. There could therefore be the potential for effects to qualifying species of the Ramsar site due to temporary loss of these habitats.

The core and potential roosting and foraging zones of several qualifying species of the Ramsar have been mapped by the Solent Waders and Brent Goose Strategy (Solent Waders and Brent Goose Strategy, 2017). The route falls outside these zones. Suitable habitat such as arable fields are abundant in the landscape around route. As such, any qualifying species of the Ramsar potentially displaced by project activities would likely readily find suitable resource nearby without detriment to site's populations. The project requires no permanent land-take (with the exception of minor land-take for valves and a new pigging station near Boorley Green). Where possible reinstatement of vegetation would be on a like for like basis whilst having regards to the restrictions of pipeline easements. As the potential wintering habitats of qualifying species along the route (e.g. arable fields) are readily restored, it is therefore considered very unlikely that there would be any significant long-term effect of habitat loss to qualifying species of the Ramsar site as a result of the project that could lead to LSE.

- b. Physical disturbance (operation)** – It is feasible that emergency repairs to the buried pipeline, once in operation, could be necessary involving the excavation and repair activities within the pipeline easement. These operations would be rare and highly localised. Further specifics on the operation of the replacement pipeline are provided in section 3.5 of ES Chapter 3. Given the nature and frequency of these activities and the distance to the Ramsar site, no significant habitat impacts, or associated disturbance would arise during the operational phase of the project.
- c. Non-physical disturbance (construction)** – For the duration of construction of the project there would be changes to noise and visual stimuli generated by movement of plant and personnel within the construction area, excavation and other groundworks, and transport. Anthropogenic noise and visual changes have well-documented disturbance effects on bird species, resulting in both behavioural and population changes (Latimer *et al.*, 2003). The potential impacts of noise and visual disturbance to the bird interest features of the Ramsar site due to the project are therefore to be considered.

There is no current authoritative guidance on how far a noise study area should extend from construction activities due to the variability of the potential noise generating activities and plant used. However, based on professional judgement, the effects of noise (as well as visual/human presence) are only likely to be significant where the route extends within or is directly adjacent to the boundary of the 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.

Given the above, the project is considered sufficiently distant from the Ramsar site (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 etc.) that noise disturbance is unlikely to have any effect on bird interest features of the Ramsar site. Similarly, at such a distance visual disturbance to the Ramsar site would not be expected to result from project activities.

The Order Limits and adjacent landscape supports arable fields, agricultural and other grassland habitats. Although the Ramsar site supports predominantly coastal and freshwater wetlands and marine habitats, some bird interest species of the Ramsar site use inland habitats for foraging and roosting during the winter, e.g. brent geese utilise cereal fields close to the coast and species such as lapwing disperse more widely to use farmland habitats. There is therefore potential for effects to the Ramsar site due to habitat loss or disturbance as a result of project activities beyond the boundary of the Ramsar site.

The core and potential roosting and foraging zones bird interest features of the Ramsar site have been mapped by the Solent Waders and Brent Goose Strategy (Solent Waders and Brent Goose Strategy, 2017). The route falls outside these zones. Moreover, suitable habitat such as arable fields are abundant in the landscape around the route. As such, any qualifying species of the Ramsar present outside these zones that may be temporarily displaced for the duration of the project would likely find suitable alternative resource nearby without detriment to Ramsar populations.

Any other indirect disturbance pathways, such as visual disturbance due to changes to landscape structure during construction that would be visible from the air during migration, are also likely to be insignificant due to the small scale and temporary nature of the project in the context of the wider landscape. The project is not considered likely to generate noise and visual disturbance to bird interest features present in habitats outside the Ramsar site that would lead to LSE.

- d. Non-physical disturbance (operation)** – It is feasible that emergency repairs to the buried pipeline, once in operation, could be necessary involving the excavation and repair activities within the pipeline easement. There is a low-risk that such activities could cause changes in the audio-visual baseline and disturbance to bird species present in the local vicinity. However, these operations would be rare and highly localised. Further specifics on the operation of the replacement pipeline are provided in section 3.5 of ES Chapter 3. Given the nature and frequency of these activities and the distance to the Ramsar site, no significant disturbance would arise during the operational phase of the project. No LSE are anticipated.
- e. Hydrological changes (construction)** – The functional link between the Ramsar site and the project comprises the two small tributaries of the River Hamble that would be crossed during construction. The interest features of the Ramsar site are dependent upon hydrological, geomorphological and marine processes (flooding of grazing marshes, tidal and fluvial dynamics etc.) that operate over an extremely large scale (the site itself has an area of 5,346.44ha). Any hydrological modifications to the watercourses due to the project are considered likely to be localised, short duration, and reversible and so not likely to have a significant effect on the Ramsar site.

The project also has the potential to generate emissions to ground- and surface water bodies connected to the River Hamble upstream of the Ramsar site, either during construction or as a result of pipe leaks during operation. Emissions could be generated during construction by spillages of fuels or leaking construction plant. Emissions could also be generated during construction by uncontrolled silting of waterbodies or the discharge of nutrient-enriched runoff as a result of excavations.

The project has very low potential to generate emissions to ground- and surface water bodies as a result of construction activities (accidental spillages, silting etc.) and operation of the pipeline (leaks). As the route crosses tributaries of the River Hamble upstream of the Ramsar site, there is a theoretical pathway for effects to occur to the site. This could cause destruction or damage of qualifying habitats and habitats supporting qualifying species of the Ramsar. However, the two watercourses that would be crossed by the route are very small in comparison to the large freshwater and estuarine systems that comprise the Ramsar site and which supports the qualifying habitats and habitat supporting the qualifying species of the site. There would also be a large distance between the Ramsar site and any point of discharge of contaminants to these watercourses.

The construction of the project across the tributary of the River Hamble at Ford Lake by trenchless techniques would also further reduce the low risk of surface water contamination as machinery would be working at distance from the watercourse. The use of trenchless techniques at this location is proposed for construction reasons and not because there is a theoretical pathway for effects to the Ramsar site, and therefore does not constitute mitigation to avoid or reduce effects to the site.

Moreover, the risk of pollution events occurring during construction are considered to be extremely low because potential sources of contamination (e.g. vehicles, plant or fuel) would typically not come into contact with the water environment. The risk of contamination of the Ramsar site via hydrological pathways during construction of the project is considered to be extremely low and no LSE are anticipated.

- f. Hydrological changes (water quality changes) and ground contamination (operation)** – Emissions to watercourses or soils local to the pipeline route could be generated during pipeline operation as a result of pipeline leaks. The risk of changes to water quality, or ground contamination during operation is considered to be extremely low. The principles of inherent safe design have been incorporated into the design of the pipeline as per Esso design standards for fuel pipelines, relevant industry codes of practice and standards and the requirements of the Pipeline Safety Regulations 1996 (O8). Key principles of the design include a design life of 60 years; protection against corrosion; necessary equipment required for pipeline inspection; inclusion of remotely operated valves to allow isolation of sections of the pipeline if required (O9); and 24-hour remote monitoring of pipeline operation to detect leaks and enable remote shut down of the pipeline if required (O10). As such, the risk of contamination of the Ramsar during the operational phase of the project is considered to be extremely low and no LSE are anticipated.
- g. Air quality changes (construction)** - The construction works for the project would require plant and machinery that have the potential to generate dust and local emissions. The Ramsar is beyond the 200m zone of influence within which emissions or fugitive dust from the project construction are likely to have a significant impact on the qualifying habitats or habitats supporting qualifying species of the Ramsar (Highways Agency, 2007; IAQM, 2014).
- h. Ground contamination (construction)** - The accidental release of hazardous chemicals on site during construction works as a result of equipment failure or human error could result in soil contamination and impacts on the local environment. There is a theoretical pathway for effects to qualifying species of the Ramsar that use inland terrestrial habitats for foraging due to a loss, or degradation of supporting habitats due to contamination. The route would not interact directly with the Ramsar site. That effects could only result where the project would potentially damage or destroy suitable foraging, roosting or breeding habitat outside the European site substantially weakens the nature of the pathway to significant effects. As



the Order Limits fall outside core and potential roosting and foraging zones of qualifying species as mapped by the Solent Waders and Brent Goose Strategy (Solent Waders and Brent Goose Strategy, 2017) and in light of the scale (and associated plant) and temporary duration of the works that would not permit a pervasive, or large-scale contamination event, LSE are not predicted.

- i. **In combination** – An in-combination assessment has been undertaken and is presented in Appendix E. No in-combination effects are anticipated.

**Table D.5: HRA screening matrix for South West London Waterbodies SPA site (based on that set out in Planning Inspectorate Advice Note Ten (2017))**

**Matrix key**

✓ = Likely significant effect cannot be excluded **x** = Likely significant effect **can** be excluded

**C** = construction **O** = operation **D** = decommissioning **B** = Breeding **W** = Wintering **P** = on Passage

South West London Waterbodies Special Protection Area (SPA)																					
EU Code: UK9012171																					
Distance to NSIP: The SPA comprises seven reservoirs and lakes and is underpinned by Ramsar designation UK11065. The route is approximately 650m to the east of the closest SPA component site of Staines Moor SSSI, but also passes near to lakes within the wider complex of waterbodies in the southwest London area that are known to be important in sustaining populations of the qualifying species of the SPA (Natural England, 2016). The route interacts with these waterbodies as follows: <ul style="list-style-type: none"> <li>The route is approximately 10m to the east of the lakes that are west of Littleton Lane (SU 06513 67140).</li> <li>The route passes within 35m of a small complex of lakes along Ashford Road.</li> <li>The route crosses the Laleham intake channel at SU 05577 69458 - the main supply of the Queen Mary Reservoir (functionally linked to the SPA) and crosses the Staines Reservoirs Aqueduct, at SU 06131 70677.</li> <li>To the north of Ashford, the route corridor is located between 40m and 120m west of the lakes comprising the former Princes Club Watersports Park (SU 06635 72001 to SU06723 72584).</li> </ul>																					
European site features			Likely effects of NSIP																		
Effect	Physical disturbance			Non-physical disturbance			Hydrological changes			Air quality changes			Ground contamination			Invasive non-native species			In-combination effects		
Stage of development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Gadwall ( <i>Anas strepera</i> ) <b>W</b>	<b>x</b> a	<b>x</b> a		<b>x</b> b	<b>x</b> c		<b>x</b> d	<b>x</b> e		<b>x</b> f			<b>x</b> g	<b>x</b> e		<b>x</b> h			<b>x</b> i	<b>x</b> i	
Shoveler ( <i>Anas clypeata</i> ) <b>W</b>	<b>x</b> a	<b>x</b> a		<b>x</b> b	<b>x</b> c		<b>x</b> d	<b>x</b> e		<b>x</b> f			<b>x</b> g	<b>x</b> e		<b>x</b> h			<b>x</b> i	<b>x</b> i	

- Physical disturbance (construction)** – As the project would not be within any components of the SPA, any effect to qualifying species due to habitat loss could only likely result where construction would potentially damage or destroy suitable foraging, roosting or breeding habitat along the route. The qualifying species of the SPA require areas of open water for foraging and roosting, and terrestrial habitat near to water such as short grassland or scrub for birds to rest up on. Habitats such as woodland may also act as screens from disturbance. The area around the waterbodies near to which the route would be constructed are generally urban or industrial, and no habitats of value to the qualifying features would be damaged or destroyed. It is therefore considered that there would be no effect to the SPA due to direct physical habitat loss resulting from the construction or operation of the project.
- Non-physical disturbance (construction)** – 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). The potential impacts of noise and visual disturbance to qualifying species of the SPA because of the project are therefore considered.

There is no current authoritative guidance on how far a noise study area should extend from construction activities due to the variability of the potential noise generating activities and plant used. However, the effects of noise (as well as visual/human presence) are only likely to be significant where the route extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting or breeding habitat that supports mobile animal species for which a European site is designated.

Given the above, the project is considered sufficiently distant from the SPA (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, piling etc.) that noise disturbance is unlikely to have any effect on qualifying features within the SPA. Similarly, at such a distance visual disturbance to the SPA would not be expected to result from project activities.

Outside of the SPA, disturbance may result from the project where the route is near to other areas that the qualifying species use during the winter. The 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. A more detailed discussion is provided below.

*Littleton Lane Waterbodies*

The route runs to the west of Littleton Lane, through a gravel extraction site and arable fields (Figure 9.3). There are continuous rows of scrub and hedgerow either side of the length of Littleton Lane, screening the lakes to the east. In the southern half of the Lane, between the route and the lakes to the west (approximately 165m) there are industrial facilities, and to the north a large area of arable fields. The lake to the east of Littleton Lane is used by the Littleton Sailing Club (TQ 060 674), and there are residential areas adjacent to the lakes to the northeast (Plates 1 and 2).

The above description demonstrates that there are existing noise and visual disturbance pressures to these lakes, including disturbance from the M3 motorway, recreation and industry. Although the current importance of these waterbodies to the SPA 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 waterbody). Moreover, as the pathway for noise and visual disturbance arising from project activities is to some extent buffered by trees or built-up areas between Littleton Lane and the waterbodies as described above, then any increased noise or visual stimuli arising from the project are considered likely to be mitigated by these existing buffers.

Given the above, it is considered unlikely that any disturbance resulting from the project would lead to a significant effect to the SPA via this effects pathway.

*Queen Mary Reservoir and lakes to the west*

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 (Figure 9.3). 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.

*Former Princes Club Watersports Park*

The Order Limits run to the west of the waterbodies comprising the former Princes Club Watersports Park, north of Ashford (Figure 9.3). The Order Limits run through playing fields of the school between 40m and 120m west of these waterbodies. Between the route and the waterbodies to the east there is a continuous line of mature scrub and trees along the boundary between the playing fields and a former club house of the watersports park (Google Earth, 2018), which is considered to provide a screen for noise and visual disturbance effects arising from construction within the route and the waterbodies to the east. Given the 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.

- c. **Non-physical disturbance (operation)** – It is feasible that emergency repairs to the buried pipeline, once in operation, could be necessary involving the excavation and repair activities within the pipeline easement. There is a low-risk that such activities could cause changes in the audio-visual baseline and disturbance to bird species in the local vicinity. However, these operations would be rare and highly localised. Further specifics on the operation of the replacement pipeline are provided in section 3.5 of ES Chapter 3. Given the nature and frequency of these activities, the existing levels of disturbance in this area, and the distance to the SPA, no significant disturbance would arise during the operational phase of the project. No LSE are anticipated.
- d. **Hydrological changes (water quality) (construction)** – The project has the potential to generate emissions to ground- and surface water bodies hydrologically or functionally connected to the SPA during construction. Emissions could be generated during construction by spillages of fuels or leaking construction plant. Emissions could also be generated during construction by uncontrolled silting of waterbodies or the discharge of nutrient-enriched runoff as a result of excavations. The project has very low potential to generate emissions to surface water bodies connected to the SPA during construction. The Order Limits are approximately 650m from the SPA. 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 (TC037) 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 (TC039). These embedded design measures are secured through the project design set out in the DCO application. As such, the potential for contamination of waterbodies connected to the SPA is extremely remote and so LSE are not predicted.
- e. **Hydrological changes (water quality) and ground contamination (operation)** - Emissions to watercourses or soils local to the pipeline route could be generated during pipeline operation as a result of pipeline leaks. This could result in the loss or degradation of supporting habitats for qualifying species and could place the qualifying features at risk of both lethal and sub-lethal effects. The risk of operational contamination is considered to be extremely low. The principles of inherent safe design have been incorporated into the design of the pipeline as per Esso design standards for fuel pipelines, relevant industry codes of practice and standards and the requirements of the Pipeline Safety Regulations 1996 (O8). Key principles of the design include a design life of 60 years; protection against corrosion; necessary equipment required for pipeline inspection; inclusion of remotely operated valves to allow isolation of sections of the pipeline if required (O9); and 24-hour remote monitoring of pipeline operation to detect leaks and enable remote shut down of the pipeline if required (O10). As such, the risk of contamination of the SPA during the operational phase of the project is considered to be extremely low and no LSE are anticipated.
- f. **Air quality changes (construction)** - The construction works for the project would require plant and machinery that have the potential to generate dust and local emissions to air. However, given the relatively small scale of the works required, lack of terrestrial habitat and large-scale availability of aquatic habitat suitable to the qualifying species, it is considered that any effects of degradation of habitat that might result from the project due to temporary air quality changes are likely to be *de minimis* and not significant to the SPA.
- g. **Ground contamination (construction)** - The accidental release of hazardous chemicals during construction works as a result of equipment failure or human error could result in soil contamination, which could in turn impact local ecology. There is a theoretical pathway for effects to qualifying species of the site that use inland terrestrial habitats for foraging due to a loss, or degradation of supporting habitats due to soil contamination. Given the scale and temporary duration of the works that would not permit a pervasive, or large-scale contamination event and large-scale availability of aquatic habitat suitable to the qualifying species, LSE are not predicted.
- h. **Invasive non-native species (construction)** – Disturbance of supporting habitats of qualifying species of SPA due to spread of invasive non-native species (INNS) has also been considered. Changes to aquatic habitats supporting qualifying species of the SPA caused by INNS could theoretically occur if the project activities were to encounter these and cause them to spread to nearby waterbodies or via the watercourses encountered by the route. This could cause changes in the structural properties of habitats on which the qualifying species depend, for example invertebrate communities. The project does not involve the transfer of water or materials into the SPA or its supporting waterbodies. Further, 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 (TC037) to reduce obstruction to the canal. Trenchless techniques would also be used to go under the Staines Bypass, the River Ash and Woodthorpe Road from Fordbridge Park (TC039). These embedded design measures are secured through the project design set out in the DCO application. As such, the potential for the spread of INNS into waterbodies connected to the SPA is extremely remote and LSE are not predicted.
- i. **In combination** – An in-combination assessment has been undertaken and is presented in Appendix E. No in-combination effects are anticipated.

Table D.6: HRA screening matrix for South West London Waterbodies Ramsar site (based on that set out in Planning Inspectorate Advice Note Ten (2017))

Matrix key

✓ = Likely significant effect cannot be excluded ✗ = Likely significant effect can be excluded

C = construction O = operation D = decommissioning B = Breeding W = Wintering P = on Passage

South West London Waterbodies Ramsar site																					
EU Code: UK11065																					
<p><b>Distance to NSIP:</b> The Ramsar site comprises seven reservoirs and lakes and is underpinned by Ramsar designation UK11065. The Order Limits are approximately 650m to the east of the closest Ramsar component site - Staines Moor SSSI, but also passes near to lakes within the wider complex of waterbodies in the southwest London area that are known to be important in sustaining populations of the qualifying species of the Ramsar (Natural England, 2016). The Order Limits interact with these waterbodies as follows:</p> <ul style="list-style-type: none"> <li>The Order Limits are approximately 10m to the east of the lakes that are west of Littleton Lane (SU 06513 67140).</li> <li>The Order Limits pass within 35m of a small complex of lakes along Ashford Road.</li> <li>The Order Limits cross the Laleham intake channel at E: 505577 N: 169458 - the main supply of the Queen Mary Reservoir, and crosses the Staines Reservoirs Aqueduct, at E: 506131 N: 170677.</li> <li>To the north of Ashford, the Order Limits are located between 40m and 120m west of the lakes comprising the former Princes Club Watersports Park (E: 506635 N: 172001 to E: 506723 N: 172584).</li> </ul>																					
European site features			Likely effects of NSIP																		
Effect	Physical disturbance			Non-physical disturbance			Hydrological changes			Air quality changes			Ground contamination			Invasive non-native species			In-combination effects		
Stage of development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Ramsar criterion 6 – species/population occurring at levels of international importance. Gadwall ( <i>Anas strepera</i> ) W	✗a	✗a		✗b	✗c		✗d	✗e		✗f			✗g	✗e		✗h			✗i	✗i	
Ramsar criterion 6 – species/population occurring at levels of international importance. Northern shoveler ( <i>Anas clypeata</i> ) B	✗a	✗a		✗b	✗c		✗d	✗e		✗f			✗g	✗e		✗h			✗i	✗i	

- a. **Physical disturbance (construction)** – As the project would not be within any components of the Ramsar site, any effect to qualifying species due to habitat loss could only likely result where construction would potentially damage or destroy suitable foraging, roosting or breeding habitat along the Order Limits. The qualifying species of the Ramsar site require areas of open water for foraging and roosting, and terrestrial habitat near to water such as short grassland or scrub for birds to rest up on. Habitats such as woodland may also act as screens from disturbance. The area around the waterbodies near to which the route would be constructed are generally urban or industrial, and no habitats of value to the qualifying features would be damaged or destroyed. It is therefore considered that there would be no effect to the Ramsar site due to direct physical habitat loss resulting from the project's construction or operation.
- b. **Non-physical disturbance (construction)** – 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). The potential impacts of noise and visual disturbance to qualifying species of the Ramsar site because of the project are therefore to be considered.

There is no current authoritative guidance on how far a noise study area should extend from construction activities due to the variability of the potential noise generating activities and plant used. However, the effects of noise (as well as visual/human presence) are only likely to be significant where the Order Limits extend within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting or breeding habitat that supports mobile animal species for which a European site is designated.

Given the above, the project is considered sufficiently distant from the Ramsar site (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, piling etc.) that noise disturbance is unlikely to have any effect on qualifying features within the Ramsar site. Similarly, at such a distance, visual disturbance to the Ramsar site would not be expected to result from project activities.

Outside of the Ramsar site, disturbance may result from the project where the Order Limits pass 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 Ramsar site, 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 Ramsar site are known to have used these waterbodies, albeit in small numbers (Briggs, 2007). As the timing of the works in this section of the route have yet to be confirmed, there is the potential for project activities to cause noise or visual disturbance during the winter when the qualifying species might be present.

Littleton Lane Waterbodies



The Order Limits run to the west of Littleton Lane, through a gravel extraction site and arable fields (Figure 9.3). There are continuous rows of scrub and hedgerow either side of the length of Littleton Lane, screening the lakes to the east. In the southern half of the Lane, between the route and the lakes to the west (approximately 165m) there are industrial facilities, and to the north a large area of arable fields. The lake to the east of Littleton Lane is used by the Littleton Sailing Club (TQ 060 674), and there are residential areas adjacent to the lakes to the northeast (Plates 1 and 2).

The above description demonstrates that there are existing noise and visual disturbance pressures to these lakes, including disturbance from the M3 motorway, recreation and industry. Although the current importance of these waterbodies to the Ramsar site are unknown, given this context it is likely that if birds of the qualifying species do use these waterbodies during the winter then they are habituated to the existing levels of disturbance. Moreover, as there are many waterbodies in the surrounding 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 waterbody).

Given the above, it is considered unlikely that any disturbance resulting from the project would lead to a significant effect to the Ramsar site. Moreover, as the pathway for noise and visual disturbance arising from Project activities is to some extent buffered by trees or built-up areas between Littleton Lane and the waterbodies as described above, then any increased noise or visual stimuli arising from the project are considered likely to be mitigated by these existing buffers.

#### *Queen Mary Reservoir and lakes to the west*

The Order Limits pass near to Queen Mary Reservoir and a series of small waterbodies to its west runs approximately 350m to the west of the reservoir adjacent to a residential area (Figure 9.3). 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 Ramsar site.

#### *Former Princes Club Watersports Park*

The Order Limits run to the west of the waterbodies comprising the former Princes Club Watersports Park, north of Ashford (Figure 9.3). The Order Limits pass through playing fields of the school between 40m and 120m to the west of these waterbodies. Between the route and the waterbodies to the east there is a continuous line of mature scrub and trees along the boundary between the playing fields and a former club house of the watersports park (Google Earth, 2018), which is considered to provide a screen for noise and visual disturbance effects arising from construction within the route and the waterbodies to the east. Given the 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 Ramsar site.

- c. **Non-physical disturbance (operation)** – It is feasible that emergency repairs to the buried pipeline, once in operation, could be necessary involving the excavation and repair activities within the pipeline easement. There is a low-risk that such activities could cause changes in the audio-visual baseline and disturbance to bird species in the local vicinity. However, these operations would be rare and highly localised. Further specifics on the operation of the replacement pipeline are provided in section 3.5 of ES Chapter 3. Given the nature and frequency of these activities, the existing levels of disturbance in this area, and the distance to the Ramsar site, no significant changes in the audio-visual baseline would arise during the operational phase of the project and no LSE due to non-physical disturbance are anticipated.
- d. **Hydrological changes (water quality) (construction)** - The project has the potential to generate emissions to ground- and surface water bodies hydrologically or functionally connected to the SPA during construction. Emissions could be generated during construction by spillages of fuels or leaking construction plant. Emissions could also be generated during construction by uncontrolled silting of waterbodies or the discharge of nutrient-enriched runoff as a result of excavations. The project has very low potential to generate emissions to surface water bodies connected to the Ramsar site during construction. The Order Limits are approximately 650m from the Ramsar site. The crossing of surface water features with connectivity to Ramsar-linked waterbodies would be achieved through trenchless construction techniques. Trenchless techniques would be used to cross Queen Mary Reservoir Intake Canal (TC037) 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 (TC039). These embedded design measures are secured through the project design set out in the DCO application. As such, the potential for contamination of waterbodies connected to the Ramsar site is extremely remote and so LSE are not predicted.
- e. **Hydrological changes (water quality) and ground contamination (operation)** - Emissions to watercourses or soils local to the pipeline route could be generated during pipeline operation as a result of pipeline leaks. This could result in the loss or degradation of supporting habitats for qualifying species and could place the qualifying features at risk of both lethal and sub-lethal effects. The risk of operational contamination is considered to be extremely low. The principles of inherent safe design have been incorporated into the design of the pipeline as per Esso design standards for fuel pipelines, relevant industry codes of practice and standards and the requirements of the Pipeline Safety Regulations 1996 (O8). Key principles of the design include a design life of 60 years; protection against corrosion; necessary equipment required for pipeline inspection; inclusion of remotely operated valves to allow isolation of sections of the pipeline if required (O9); and 24-hour remote monitoring of pipeline operation to detect leaks and enable remote shut down of the pipeline if required (O10). As such, the risk of contamination of the Ramsar site during the operational phase of the project is considered to be extremely low and no LSE are anticipated.
- f. **Air quality changes (construction)** - The construction works for the project would require plant and machinery that have the potential to generate dust and local emissions to air. However, given the relatively small scale of the works required, lack of terrestrial habitat and large-scale availability of aquatic habitat suitable to the qualifying species, it is considered that any effects of degradation of habitat that might result from the project due to temporary air quality changes are likely to be *de minimis* and not significant to the Ramsar site.
- g. **Ground contamination (construction)** - The accidental release of hazardous chemicals during construction works as a result of equipment failure or human error could result in soil contamination, which could in turn impact local ecology. There is a theoretical pathway for effects to qualifying species of the site that use inland terrestrial habitats for foraging due to a loss, or degradation of supporting habitats due to soil contamination. Given the scale and temporary duration of the works that would not permit a pervasive, or large-scale contamination event and large-scale availability of habitat suitable to the qualifying species, LSE are not predicted.
- h. **Invasive non-native species (construction)** – Disturbance of supporting habitats of qualifying species of Ramsar site due to spread of invasive non-native species (INNS) has also been considered. Changes to aquatic habitats supporting qualifying species of the Ramsar site caused by INNS could theoretically occur if the project activities were to encounter these and cause them to spread to nearby waterbodies or via the watercourses encountered by the route. This could cause changes in the structural properties of habitats on which the qualifying species depend, for example invertebrate communities. The project does not involve the transfer of water or materials into the Ramsar site or its supporting waterbodies. Further, the Order Limits are approximately 650m from the Ramsar site. The crossing of surface water features with connectivity to Ramsar-linked waterbodies would be achieved through trenchless construction techniques. Trenchless techniques would be used to cross Queen Mary Reservoir Intake Canal (TC037) to reduce obstruction to the canal. Trenchless techniques would also be used to go under the Staines Bypass, the River Ash and Woodthorpe Road from Fordbridge Park (TC039). These embedded design measures are secured through the project design set out in the DCO application. As such, the potential for the spread of INNS into waterbodies connected to the Ramsar site is extremely remote and LSE are not predicted.
- i. **In combination** – An in-combination assessment has been undertaken and is presented in Appendix E. No in-combination effects are anticipated.



Table D.7: HRA screening matrix for Thames Basin Heaths SPA (based on that set out in Planning Inspectorate Advice Note Ten (2017))

Matrix key

✓ = Likely significant effect cannot be excluded ✗ = Likely significant effect can be excluded

C = construction O = operation D = decommissioning

Thames Basin Heaths Special Protection Area (SPA)																					
EU Code: UK9012141																					
Distance to NSIP – The SPA comprises part or all of 12 SSSIs. The Order Limits pass through or near to four of these sites (Figure 9.5). These sites are 1) Bourley and Long Valley SSSI for approximately 1.5km 2) Chobham Common SSSI for approximately 2.4km 3) Colony Bog and Bagshot Heath SSSI for approximately 4km and 4) Eelmoor Marsh SSSI, where the Order Limits are outside the site, but the route passes along the northern site boundary for approximately 300m.																					
European site features			Likely effects of NSIP																		
Effect	Physical disturbance			Non-physical disturbance			Hydrological changes			Air quality changes			Ground contamination			Invasive non-native species			In-combination effects		
Stage of development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Dartford warbler ( <i>Sylvia undata</i> )	✗a	✗b		✓c	✗d		✗e	✗f		✗g			✗h	✗f		✗i			✗j	✗j	
Nightjar ( <i>Caprimulgus europaeus</i> )	✗a	✗b		✓c	✗d		✗e	✗f		✗g			✗h	✗f		✗i			✗j	✗j	
Woodlark ( <i>Lullula arborea</i> )	✗a	✗b		✓c	✗d		✗e	✗f		✗g			✗h	✗f		✗i			✗j	✗j	

a. **Physical disturbance (construction)** – The route would affect habitat within the SPA. Construction of the pipeline within the Order Limits would require excavations and clearance of vegetation within the SPA. Excavations would be required to install the pipeline; these would mostly be by open cut although two consecutive trenchless crossing (TC011 and TC012) would be used to avoid wetland areas within the Bourley and Long Valley SSSI component of the SPA (see Figure 9.6). The assumed technique for TC011 and TC012 is HDD trenchless technique over approximately 312m and 400m respectively. Three trenchless crossings are proposed in the Chobham Common SSSI component of the SPA to cross areas of wetland. The assumed technique for TC024, TC025 and TC026 is HDD trenchless technique over approximately 237m, 232m and 271m respectively (Figure 9.14). Vegetation clearance would be required in advance of construction works (where these areas were vegetated) to facilitate the movement of construction plant etc. and to displace wildlife from the working area (e.g. reptiles and amphibians). 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. The qualifying species of the SPA could potentially use any of the heathland habitats to be affected by the works, either for breeding, roosting or foraging and could suffer the effects of habitat loss. The main breeding habitats of Dartford warbler, nightjar and woodlark comprise open habitats of dwarf shrubs with scattered scrub and trees.

Effects to the SPA via the pathway of loss of habitat supporting the qualifying species are considered not to be significant. The total area of the SPA is 8,274.7ha. The total area of habitat within the Order Limits is approximately 36.20ha and accounts for approximately 0.4% of the SPA's total area. It is not anticipated that the entire Order Limits area would be given over to construction activity. Even in a hypothetical scenario during which the total 36.20ha area of SPA within the Order Limits were temporarily destroyed during construction, it is not anticipated that LSE would arise given the small area of the total SPA resource that would be affected. All area of habitat loss would be temporary, to be restored on completion of the works. Full regeneration to acid grassland and pioneer heathland is anticipated to occur within the short term (i.e. within five years following construction) (South East Water, 2018).

The results of the desk study of breeding sites of the qualifying species within the SPA (Appendix C) confirm that the species use or have used in the recent past a much larger area than that which would be affected by the project. This would indicate that there is ample available habitat elsewhere in the SPA for qualifying species to relocate to, while restored habitat develops. Areas of bare earth are suitable for nesting nightjar (Berry, 1979) and woodlark (Sitters, *et al.*, 1996), so that habitat disturbed by the project would not be completely unsuitable for the qualifying species during the regeneration period.

In summary, the loss of habitat suitable for the qualifying species of the SPA is of small scale and temporary. Any effects to the SPA via the pathway of habitat loss are therefore considered to be *de minimis*.

b. **Physical disturbance (operation)** – It is feasible that emergency repairs to the buried pipeline, once in operation, could be necessary involving the excavation and repair activities within the pipeline easement. These operations would be rare and highly localised. Further specifics on the operation of the replacement pipeline are provided in section 3.5 of ES Chapter 3. Given the nature and frequency of these activities, no significant habitat impacts, would arise during the operational phase of the project.

c. **Non-physical disturbance (construction)**

*Disturbance as a result of noise and visual stimuli during construction*

For the duration of construction of the project there would be changes to noise and visual stimuli generated by movement of plant and personnel within the construction area, excavation and other groundworks, and transport. Anthropogenic noise and visual changes have well-documented disturbance effects on bird species, resulting in both behavioural and population changes (e.g. Latimer *et al.*, 2003). The potential impacts of noise and visual disturbance to qualifying species of the SPA associated with the project should therefore be considered.

*Breeding season*

There is no current authoritative guidance on how far a noise study area should extend from construction activities due to the variability of the potential noise generating activities and plant used. However, the effects of noise (as well as visual/human presence) are only likely to be significant where the boundary of the project extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting or breeding habitat that supports mobile animal species for which a European site is designated. As the project would take place within and immediately adjacent to the SPA, the project has the potential to impact SPA populations of the qualifying species. A

desk-study of breeding sites of qualifying species between 2007-2018 (Appendix C) shows that the Order Limits pass through areas of the SPA that have consistently supported breeding territories for the qualifying species of the site. The proposed works would be temporary and would not involve activities likely to generate continuous or regular loud noise events (e.g. pile driving, blasting etc.), that are more typically associated with causing disturbance to birds (Latimer *et al*, 2003). As construction would take place largely along tracks open to the public there would already be a level of disturbance along the Order Limits. Nonetheless, in the absence of mitigation and in view of the sensitivity of the qualifying interests to disturbance, the risk of LSE cannot be discounted. The pathway for LSE due to noise and visual stimuli during construction should be considered at Appropriate Assessment.

#### *Outside the SPA*

The habitat outside of the SPA is generally suboptimal, with only very small pockets of relict heathland within plantation forestry and amenity areas. While works outside of the SPA may occur during the breeding season, any effects resulting from the project due to disturbance of SPA populations of the qualifying species breeding outside of the site are therefore likely to be *de minimis*.

#### *Non-breeding season*

The Conservation Objectives concern the maintenance of breeding population levels and supporting habitat, including minimisation of human disturbance and protection from predation. Breeding success would not be impaired by any construction works outside the breeding season. Nightjar migrate in August or September and are not present within the SPA outside the breeding season. Winter disturbance impacts to this qualifying species are therefore not considered further. Dartford warbler and woodlark are present during winter but are much less sensitive to disturbance outside the breeding period (Natural England, 2016). Mallord *et al.* (2006) found that woodlark only settled to breed in low-disturbance areas, but heavily disturbed areas were still used for foraging.

There could be a temporary disruption in habitat connectivity/structure as a result of the project. As a proportion of the construction working corridor would comprise existing tracks (e.g. around 3-5m wide at Chobham Common SSSI) in some places, this temporary disruption would be a small increase in the width of existing fragmentation. As the qualifying species of the SPA are highly mobile and the works avoidable, this temporary disruption would not be consequential to habitat connectivity.

Noting that breeding success would not be affected at this time of year and the vast availability of alternative supporting habitat within the site, it is not considered that these objectives would be undermined, or the ecological integrity of the site compromised during winter. As supporting habitat has been identified within and adjacent to the Order Limits, the two Annex I birds present in winter would likely experience some temporary changes in the audio-visual baseline. Notwithstanding, it is not considered that disturbance could undermine the integrity of the supporting (foraging and roosting) habitat available within the site, or the population status of the two Annex I species present in winter. This is on the basis that plenty of 'disturbance-free' areas would provide safe feeding sites and allow sufficient time for the birds to feed and recover from any physiological stress.

The duration of effects would likely be for a single winter and would not affect the birds in subsequent years, other than the clearance of dense scrub and trees would create better conditions for foraging in future years (Wotton and Gillings, 2000).

It could also be relevant that in 2007, 70% of the SPA was classified as 'disturbed' due to urban development, traffic noise and other sources of intrusion (CPRE, 2007). Land within Colony Bog and Bagshot Heath SSSI is owned by the MoD and used as training areas and artillery ranges. Within Unit 4, the Order Limits are within 100m of Red Road. Based on variations in behaviour towards humans, several studies have suggested that habituation to disturbances can occur. Reaction distances for several species were shorter in high-disturbance areas compared to undisturbed areas (Cooke, 1980; Titus and van Druff, 1981; Burger and Gochfield, 1981; Keller, 1989).

#### *Disturbance as a result of increased recreational activity within the SPA*

As construction works would take place within three SANGs sites and one proposed SANG, there is a potential for project activities to discourage people from using these sites during the works period. Consequently, some recreational activity might be displaced to the SPA, resulting in increased noise and visual disturbance of qualifying species of the SPA, trampling of nests and physical disturbance of supporting habitat. If this displacement were to take place during the breeding season, then this could result in effects to the SPA. As such, the pathway for LSE by displaced recreational activities should be considered at Appropriate Assessment to clarify the location of the sites, the potential for regional displacement and the extent of the risk to site integrity.

- d. **Non-physical disturbance (operation)** – It is feasible that emergency repairs to the buried pipeline, once in operation, could be necessary involving the excavation and repair activities within the pipeline easement. There is a low-risk that such activities could cause changes in the audio-visual baseline and disturbance to bird species in the local vicinity. However, these operations would be rare and highly localised where necessary. Further specifics on the operation of the replacement pipeline are provided in section 3.5 of ES Chapter 3. Given the nature and frequency of these activities, no significant changes in the audio-visual baseline or disturbance impacts would arise during the operational phase of the project. No LSE are anticipated.
- e. **Hydrological changes (water quality) (construction)** – The project has very low potential to generate emissions to ground and surface water bodies during construction (accidental spillages, silting etc.) which could significantly damage supporting habitats of the qualifying species of the SPA. This is due to the low vulnerability of the preferred habitats of the qualifying feature (i.e. dry heath and gorse scrub) to water quality changes. As such, the potential for LSE via this effect pathway are *de minimis*.
- f. **Hydrological changes (water quality) and ground contamination (operation)** – Emissions to watercourses or soils local to the pipeline route could be generated during pipeline operation as a result of pipeline leaks. This could result in the loss or degradation of supporting habitats for qualifying species and could place the qualifying features at risk of both lethal and sub-lethal effects. The risk of operational contamination is considered to be extremely low. The principles of inherent safe design have been incorporated into the design of the pipeline as per Esso design standards for fuel pipelines, relevant industry codes of practice and standards and the requirements of the Pipeline Safety Regulations 1996 (O8). Key principles of the design include a design life of 60 years; protection against corrosion; necessary equipment required for pipeline inspection; inclusion of remotely operated valves to allow isolation of sections of the pipeline if required (O9); and 24-hour remote monitoring of pipeline operation to detect leaks and enable remote shut down of the pipeline if required (O10). As such, the risk of contamination of the SPA during the operational phase of the project is considered to be extremely low and no LSE are anticipated.
- g. **Air quality changes (construction)** – The supporting habitats of the qualifying species of the SPA, i.e. heathland, are sensitive to changes in air quality resulting from pollution, including the generation of dust and combustion exhaust gases (such as NO<sub>x</sub> and SO<sub>2</sub>). Construction activities for the project have the potential to generate effects associated with dust deposition within 50m of its boundary (IAQM, 2014). Excessive dust deposition can significantly change the nature of the supporting habitat for the qualifying features (Natural England, 2016). The total area of the SPA is 8,274.7ha. The total area of habitat within the Order Limits is approximately 36.20ha and accounts for approximately 0.4% of the SPA's total area. Even in a hypothetical scenario whereby all habitat within the Order Limits and the 50m zone of influence were temporarily modified due to dust deposition, this would still only account for approximately 49ha or 0.5% of the total area of the SPA. Furthermore, 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). During this period activities would be less likely to generate significant amounts of dust as the ground and atmospheric conditions are typically damp. The results of the desk study of breeding sites of the qualifying species within the SPA (Appendix C) confirm that the species use or have used in the recent past a much larger area than that which would be affected by the project; this would indicate that there is ample available habitat elsewhere in the SPA for qualifying species to relocate to while affected habitat is restored. Given this combination of factors, any effects of dust are predicted to be insignificant.

Construction activities for the project have the potential to generate effects resulting from air pollution associated with combustion exhaust gases arising from construction activities, leading to the deposition of nitrogen and acidifying pollutants that can adversely affect the composition and structure of vegetation. The SPA is already in exceedance of minimum and maximum critical loads for nitrogen deposition (maximum critical load: 15 kg N/ha/yr; current deposition: 21.7-26.5kg

N/ha/yr.) and in exceedance of the minimum critical load for acid deposition (Air Pollution Information System, 2017). Eelmoor Marsh SSSI would likely be buffered from additional deposition resulting from construction activities along Old Ively Road due to the screen of dense scrub and trees between Old Ively Road and the site for most of this part of the route corridor (Google Earth, 2018). The deposition of pollutants may therefore have an effect at the other SPA sites through which the route passes.

IAQM guidance (2014) specifies that '*experience with assessing the exhaust emissions from on-site plant and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in most cases, they will not need to be quantitatively assessed*'. Effects of construction activities resulting from air quality are therefore likely to be *de minimis*. Moreover, construction works would be of short duration and relatively low intensity, with relatively low numbers and sizes of plant and machinery items anticipated to operate for the construction of the pipeline simultaneously. As the most significant negative effects of nitrogen and acid deposition likely to affect the qualifying species of the SPA, such as degeneration of cover by dwarf shrubs and increase in grass cover, develop with long-term deposition (Stevens *et al.*, 2011), the short-term nature of deposition arising from project activities would also indicate that any effects are likely to be *de minimis*.

- h. Ground contamination (construction)** – The accidental release of hazardous chemicals during construction works as a result of equipment failure or human error could result in soil contamination, which could in turn impact local ecology. There is a theoretical pathway for effects to qualifying species of the site that use inland terrestrial habitats for foraging due to a loss, or degradation of supporting habitats due to soil contamination. Given the scale and temporary duration of the works that would not permit a pervasive, or large-scale contamination event and large-scale availability of habitats suitable to the qualifying species, LSE are not predicted.
- i. Invasive non-native species (construction)** – The SPA is vulnerable to the spread of a number of invasive non-native plant species, e.g. rhododendron (*Rhododendron ponticum*) which is present within the SPA. The spread of such species could negatively alter habitat structure making habitat unsuitable to the qualifying species of the SPA. Ground disturbance caused by construction activities as part of the project could spread invasive species into new areas of the SPA.
- Activities associated with the project are only likely to spread INNS to areas within, or immediately adjacent to, the Order Limits. The total area of the SPA is 8,274.7ha and the total area of habitat within the Order Limits is approximately 36.20ha (0.4% of the site's total area). In the unlikely event that invasive non-native plants were introduced to new areas, there is considered to be negligible potential for this to result in LSE, especially as the qualifying features are not highly vulnerable to this impact pathway.
- j. In combination** – An in-combination assessment has been undertaken and is presented in Appendix E. No in-combination effects are anticipated.

Table D.8: HRA screening matrix for Thursley, Ash, Pirbright and Chobham Special Area of Conservation SAC (based on that set out in Planning Inspectorate Advice Note Ten (2017))

Matrix key

✓ = Likely significant effect cannot be excluded ✗ = Likely significant effect can be excluded

C = construction O = operation D = decommissioning

Thursley, Ash, Pirbright and Chobham Special Area of Conservation (SAC)																					
EU Code: UK0012793																					
Distance to NSIP – The Order Limits pass through two SSSI components of the SAC: Chobham Common SSSI for approximately 2.4km and Colony Bog and Bagshot Heath SSSI for approximately 4km.																					
European site features		Likely effects of NSIP																			
Effect	Physical disturbance			Non-physical disturbance			Hydrological changes			Air quality changes			Ground contamination			Invasive non-native species			In-combination effects		
Stage of development	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
4010 North Atlantic wet heaths with <i>Erica tetralix</i>	✓a	✗c					✓d	✗e		✗f			✗g	✗e		✗h			✗i	✗i	
4030 European dry heaths	✗b	✗c						✗e		✗f			✗g	✗e		✗h			✗i	✗i	
7150 Depressions on peat substrates of the <i>Rhynchosporion</i>	✓a	✗c					✓d	✗e		✗f			✗g	✗e		✗h			✗i	✗i	

a. **Physical disturbance (construction)** – Construction of the route would require excavations and clearance of vegetation within the SAC. Excavations for the project would disturb substrates, including for the excavation of the pipeline trench and for any topsoil stripping within the construction working area. This could have implications for the drainage, nutrient cycling etc. of qualifying habitats of the SAC. Where qualifying habitats are present within the Order Limits, this could lead to the physical loss of qualifying habitats of the SAC. For the more spatially restricted qualifying habitats ‘Atlantic wet heaths with *Erica tetralix*’ and ‘Depressions on peat substrates of the *Rhynchosporion*’, changes in overall extent are more likely to be significant. As all areas of land used within the SAC would be restored or enhanced following construction, there would therefore be no permanent land-take for the project. Notwithstanding, as the Conservation Objectives of the SAC seek to maintain the extent of these qualifying habitats (other than a ‘trivial loss’), this pathway could lead to LSE and should be considered at Appropriate Assessment, to clarify how these features would be affected by the project.

b. **Physical disturbance (construction) – European dry heaths** – The route would affect dry heath habitat within the SAC. Construction of the pipeline within the Order Limits would require excavations and clearance of vegetation to install the pipeline. Vegetation clearance would be required in advance of works commencing (where these areas were vegetated) to facilitate the movement of construction plant etc. and to displace wildlife from the working area (e.g. reptiles and amphibians). 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.

For dry heathland habitats (i.e. the ‘European dry heaths’ feature) reinstatement would be achieved using natural regeneration and there is a high degree of confidence that this would be successful as the seedbank would be maintained and heathland flora responds well to ground disturbance. Full regeneration to acid grassland and pioneer heathland is anticipated to occur within the short term (i.e. within five years following construction) (South East Water, 2018). Based on priority habitat information available from Natural England, the area of ‘European dry heaths’ within the Order Limits is estimated to comprise approximately 1% of the area of this habitat within the SAC. Given the relatively small area of loss and reinstatement measures proposed, the effect on the SAC in respect of the ‘European dry heaths’ feature is considered to be *de minimis*.

c. **Physical disturbance (operation)** – It is feasible that emergency repairs to the buried pipeline, once in operation, could be necessary involving the excavation and repair activities within the pipeline easement. These operations would be rare and highly localised. Further specifics on the operation of the replacement pipeline are provided in section 3.5 of ES Chapter 3. In light of the nature and frequency of the works, no LSE are anticipated.

d. **Hydrological changes (hydrogeological functioning) (construction and operation)** – Wetland habitats are qualifying features of the SAC, i.e. ‘North Atlantic wet heaths with *Erica tetralix*’ and ‘Depressions on peat substrates of the *Rhynchosporion*’. These habitats can be groundwater- or surface water-dependent or rainwater-dependent (ombrotrophic) (but less likely the latter in the current context) and are very sensitive to changes in water levels, flows and chemistry. Given the above sensitivities, a pathway to LSE exists to habitat loss and or degradation through the disturbance of hydrological and hydrogeological functioning (hydro-ecology) of the qualifying habitats of the SAC. This could occur through changes to ground conditions and drainage arising during construction and/or through the permanent presence of the buried pipeline. Depending on the habitat and its hydro-ecological functioning, the zone of influence within which hydrological changes could arise could be extensive, with effects arising along diffuse pathways. There are likely areas of wetland qualifying habitats within the Order Limits which could be directly hydrologically disturbed by construction and operation of the pipeline. The location, extent and hydro-ecological function of these water-dependent habitats within the SAC should be clarified to establish how these habitats would interact with construction and operation of the pipeline. As there is a need for further information, the pathway for LSE by hydrological changes should be considered at Appropriate Assessment and the mechanisms that support these habitats within the SAC along the route clarified.

**Hydrological changes (water quality)** - Due to the nature of the proposals, the project has very low potential to generate emissions to ground and surface water bodies during construction (accidental spillages, silting etc.) which could significantly damage qualifying habitats of the SAC. As such, the potential for LSE via this effect pathway are *de minimis*. Effects due to the silting of waterbodies or the uncontrolled discharge of nutrient-enriched runoff as a result of the excavations are also considered very unlikely to occur; no LSE are anticipated.



e. **Hydrological changes (water quality) and ground contamination (operation)** – The risk of operational contamination is considered to be extremely low. The principles of inherent safe design have been incorporated into the design of the pipeline as per Esso design standards for fuel pipelines, relevant industry codes of practice and standards and the requirements of the Pipeline Safety Regulations 1996 (O8). Key principles of the design include a design life of 60 years; protection against corrosion; necessary equipment required for pipeline inspection; inclusion of remotely operated valves to allow isolation of sections of the pipeline if required (O9); and 24-hour remote monitoring of pipeline operation to detect leaks and enable remote shut down of the pipeline if required (O10). As such, the risk of contamination of the SAC during the operational phase of the project is considered to be extremely low and no LSE are anticipated.

f. **Air quality changes (construction)**

*Exhaust emissions from plant*

Qualifying habitats of the SAC are considered sensitive to changes in air quality, particularly nitrogen and acid deposition. Exceedance of critical values for air pollutants may modify the chemical status of substrate supporting qualifying habitats, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it. The project has the potential to generate effects associated with air pollution by combustion exhaust gases arising from construction activities. The SAC is already in exceedance of critical loads for nitrogen deposition (maximum critical load for 'depression on peat substrates of the *Rhynchosporion*': 15 kg N/ha/yr; current deposition: 16.1kg N/ha/yr) and in exceedance of the minimum critical load for acid deposition (Air Pollution Information System, 2017). The deposition of pollutants may therefore have an effect at the SAC sites through which the route passes.

IAQM guidance (2014), specifies that 'experience with assessing the exhaust emissions from on-site plant and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed'. Effects of construction activities resulting from air quality are therefore likely to be *de minimis*. Moreover, construction works would be of short duration and relatively low intensity, with relatively low numbers and sizes of plant and machinery items anticipated to operate for the construction of the pipeline simultaneously (see Chapter 3 Project Description of the Environmental Statement). As the most significant negative effects of nitrogen and acid deposition likely to affect the qualifying features of the SAC (e.g. degeneration of cover by dwarf shrubs and increase in grass cover) develop with long-term deposition (Stevens *et al.*, 2011), the short-term nature of deposition arising from project activities would also indicate that any effects are likely to be *de minimis*.

*Dust*

The construction work for the project would require plant and machinery that have the potential to generate dust. Construction activities for the project have the potential to generate effects associated with dust deposition within 50m of its boundary (IAQM, 2014). Excessive dust deposition can significantly change the nature of the supporting habitat for the qualifying features (Natural England, 2016). The total area of the SAC is 5,154.5ha. The total area of habitat within the Order Limits is approximately 29ha and accounts for approximately 0.5% of the SAC's total area. Even in a hypothetical scenario whereby all habitat within the Order Limits and the 50m zone of influence were temporarily modified due to dust deposition, this would still only account for approximately 40ha or 0.8% of the total area of the SAC. Furthermore, 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) (see Table 2.1 for details of seasonal constraints). This commitment covers the areas of the SAC crossed by the project. During this period activities would be less likely to generate significant amounts of dust as the ground and atmospheric conditions are typically damp. As such, any effects of dust are predicted to be *de minimis*.

g. **Ground contamination (construction)** - The accidental release of hazardous chemicals during construction works as a result of equipment failure or human error could result in soil contamination, which could in turn impact local ecology. Given the scale and temporary duration of the works that would not permit a pervasive, or large-scale contamination event, LSE are not predicted. The use of material not native to the SAC also has the potential to cause changes to chemistry of substrates within the SAC (e.g. pH). This could result in long-term effects leading to degradation or loss of qualifying habitats if qualifying habitats were present within the Limits of Deviation. The use of concrete or other kinds of material that could cause changes to chemistry of substrates within the SAC (e.g. pH) could have the potential for effects. The pathway for LSE by changes to substrate properties will be considered at Appropriate Assessment.

h. **Invasive non-native species (construction)** – The SAC is vulnerable to the spread of invasive non-native plant species, e.g. rhododendron (*Rhododendron ponticum*), which are potentially present within the Order Limits (Natural England, 2016). The spread of such species could negatively alter habitat structure and eventually the loss of qualifying habitats and could result from ground disturbance caused by construction activities as part of the project. Ground disturbance caused by construction activities as part of the project could spread invasive species into new areas of the SAC.

The SAC comprises four SSSIs with a total area of 5,154.5ha (JNCC, 2015). The area of the SAC within the Order Limits is approximately 14.50ha at Colony Bog and Bagshot Heath SSSI and 14.05ha at Chobham Common SSSI (a total of approximately 0.5% of the SAC's area). Activities associated with the project are only likely to spread INNS to areas within, or immediately adjacent to, the Order Limits. In the unlikely event that invasive non-native plants were introduced to new areas, there is considered to be negligible potential for this to result in LSE.

i. **In combination** – An in-combination assessment has been undertaken and is presented in Appendix E. No in-combination effects are anticipated