Lower Thames Crossing

6.3 Environmental Statement Appendices
Appendix 2.2 Register of Environmental Actions and Commitments (REAC)

APFP Regulation 5(2)(a)

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Lower Thames Crossing

Appendix 2.2 Register of Environmental Actions and Commitments (REAC)

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1 Register of Environmental Actions and Commitments

1.1 Introduction

1.1.1 The Register of Environmental Actions and Commitments (REAC) consolidates the mitigation commitments arising from the environmental impact assessment process for convenient reference. The REAC identifies the good practice and essential mitigation commitments that underpin the assessment of likely significant effects reported in the Environmental Statement (ES), the Habitats Regulations Assessment (Application Document 6.5) and Water Framework Directive Assessment (Application Document 6.3, Appendix 14.7). These commitments would be legally secured through Requirement 4 of Schedule 2 to the DCO.

1.1.2 The REAC contains environmental commitments that would be implemented during the construction and operational phases of the Project and would form part of the Code of Construction Practice (CoCP) (Application Document 7.11) if the DCO is granted. The commitments listed in the REAC would be incorporated into the environmental management plans produced for construction and handover stages of the Project in accordance with Requirement 4 of Schedule 2 to the DCO.

1.1.3 In this context, good practice means standard approaches and actions commonly used on infrastructure development projects to avoid or reduce environmental impacts, typically applicable across the whole Project. Essential mitigation means any additional Project-specific measures needed to avoid, reduce or offset potential impacts that could otherwise result in effects considered significant in the context of the EIA Regulations. These are in addition to the embedded mitigation measures that form part of the Project design, which are secured by the Design Principles (Application Document 7.4) and the Environmental Masterplan (Figure 2.4, Application Document 6.2).

1.2 Guide to the REAC table

1.2.1 The REAC is presented in a table format with headings setting out:

a) a unique identifier to facilitate cross reference with the ES and other DCO documentation;

b) the source of the action, e.g. ES assessment chapter;

c) a name for the commitment;

d) details of the commitment including a clear and specific description of the action, the objective of any essential mitigation and any relevant commitments relating to monitoring;

e) the achievement criteria which define successful implementation of the action;

f) identification of the party responsible for the action;

g) whether the commitment relates to the construction or operations stage of the Project; and

h) how the commitment is secured in the DCO e.g. through a Requirement.

1.2.2 Where the achievement criteria are self-explanatory the phrase ‘implementation of commitment actions is used’. As with all commitment items in the REAC, the procedures to implement these measures will be developed during detailed design or handover and documented in the environmental management plans produced in accordance with Requirement 4 of Schedule 2 to the DCO.

1.3 REAC table

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Air Quality	AQ001	ES 5.5.6	Vehicle and Plant Emissions	1. All on-road heavy vehicles would comply with the standards set within the London Low Emission Zone (LEZ) across all sites within Order Limits for the relevant class of vehicle 2. All Non-Road Mobile Machinery (NRMM) net power 37kW to 560 kW would comply with the engine emission standards set by London's Low Emission Zone for NRMM across all sites within Order Limits. From 1st September 2020, NRMM used on any site would therefore be required to meet emission standard Stage IIIB as a minimum. From 1 January 2025, NRMM used on any site would be required to meet emission standard Stage IV as a minimum. 3. Ensure all vehicle engines, mobile and fixed plant stationed on site are not left running or idling unnecessarily 4. Use low emission vehicles and plant fitted with catalysts, diesel particulate filters or similar devices where practicable 5. Use ultra-low sulphur fuels in plant and vehicles where practicable 6. Keep vehicles and plant well maintained, with routine servicing to be completed in accordance with the manufacturer's recommendations and records maintained for the work undertaken	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Air Quality	AQ002	ES 5.5.6	Demolition	Implement good practice measures to reduce dust during demolitions works such as: 1.Soft strip inside buildings before demolition (i.e. retain external walls and windows where safe to provide a screen against dust) 2. Use water suppression for dust control during demolition operations 3. Avoid explosive blasting, using appropriate manual or mechanical alternatives 4. Bag and remove any biological debris or damp down such material before demolition	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Air Quality	AQ003	ES 5.5.6	Earthworks and construction	Implement good practice controls to reduce dust during works such as: 1. Cover with topsoil and re-vegetate earthworks and exposed areas including soil stockpiles to stabilise surfaces 2. Use a cover such as hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil 3. Remove the cover systematically during work to reduce exposure of areas that are not being worked on 4. Avoid removing thin layer scabbling of concrete from structures by compressed air powered machines, where practicable 5. Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless required for a particular process, in which case ensure that appropriate additional control measures are in place to prevent escape 6. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored with suitable emission control systems to prevent escape 7. For small supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Air Quality	AQ004	ES 5.5.6	Dust from trackout	1. Use of water-assisted dust sweepers on the access and local roads to remove any material tracked out of the site 2.Avoid dry sweeping of large areas 3.Ensure vehicles entering and leaving worksites are securely covered to prevent escape of materials during transport 4.Inspect haul routes for integrity, instigate necessary repairs and record in site log book 5.Access gates to be sited at least 10m from receptors e.g. residential properties where reasonably practicable 6.Apply dust suppressants to locations where large volume of vehicles enter and exit the construction site	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Air Quality	AQ005	ES 5.5.6	Dust management good practice	1.Undertake on-site and off-site inspections to monitor dust 2.Plan site layout so that machinery and dust causing activities are located away from receptors, as far as this is reasonably practicable 3.Erect suitable solid screens or barriers around dusty activities or the site boundary 4.Avoid site runoff of water or mud 5.Remove waste materials that have a potential to produce dust from site as soon as reasonably practicable 6.Cover, seed or fence stockpiles to prevent wind whipping 7.Cutting / grinding / sawing equipment to use water as dust suppressant or suitable local extract ventilation 8.Ensure an adequate water supply on the site for effective dust/particulate matter suppression, using recycled water where reasonably practicable 9.Use enclosed chutes, conveyors and covered skips to reduce escape of dust 10. Reduce drop heights from conveyors, loading shoves, hoppers and other loading or handling equipment to a practical minimum and use fine water sprays on such equipment where appropriate 11.Ensure equipment is readily available on site to clean any spillages and clean up spillages as soon as the spill is identified 12.Reuse and recycle waste to reduce dust from waste materials	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Air Quality	AQ006	ES 5.5.6	Air Quality monitoring during construction	Air quality monitoring would be undertaken during the construction phase of the project to ensure that the mitigation measures effectively control dust emissions. Monitoring would include visual inspections and in some circumstances a programme of dust monitoring may be required. The need for dust monitoring would be determined once a contractor has been appointed based on the likelihood of adverse dust effects occurring at receptors on a site by site basis. Should dust monitoring be required the location of monitors and the type of monitoring, would be submitted in advance to the relevant local authorities for consultation. Monitoring would begin at least three months prior to the commencement of the construction works to allow a suitable pre-construction baseline to be established unless otherwise agreed by Highways England in consultation with the relevant local authorities.	Approval of air quality monitoring programme by the SoS in consultation with relevant local authorities	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Climate	CC001	ES 15.5.14 a (iv)	PAS2080	The main works contractors will adhere to PAS 2080 throughout the works and develop a compliant approach detailing how GHG emissions reductions will be identified, prioritised, implemented and monitored during construction. The main works contractors will be required to submit their PAS 2080 approach to Highways England for acceptance within three months of appointment. The main works contractors will be required to obtain certification/verification by an accredited organisation that verifies PAS 2080 within 12 months of appointment.	Implementation of a PAS2080 compliant greenhouse-gas emission monitoring and minimisation approach during construction.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Climate	CC002	ES 15.5.14 b (v)	Greenhouse gas emissions: reduction from the carbon model baseline	The Contractor would reduce GHG emissions below the baseline emissions presented in the Project's carbon model within Appendix 15.1 of the ES: CEP (Application Document 6.3). The Contractor would develop and achieve a carbon reduction target to be agreed by Highways England.	Achievement of target GHG emissions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Climate	CC003	ES 15.8.3	Greenhouse gas emissions: quantification and reporting of GHG emissions	The Contractor(s) would quantify and report GHG emissions quarterly to Highways England in line with the requirements of DMRB LA 114 Climate. This information would be evaluated by Highways England and used to inform assessment of future projects.	Submission of quarterly reports on GHG emissions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Climate	CC004	ES 15.5.14 b (vi)	Greenhouse gas emissions: compound electricity	The Contractor(s) would procure electricity from renewable electricity suppliers to cover the consumption from the Project's construction compounds (including the consumption of the tunnel boring machine and concrete batching plant).	Procurement of renewable electricity to cover consumption from construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good practice
Climate	CC005	ES 15.5.15	Greenhouse gas emission: Operational phase emissions monitoring	The road operator would provide quarterly GHG emissions returns and analysis from the operation and maintenance of the Project to Highways England during the operational phase in accordance with the requirements of DMRB LA 114 Climate. This information would be evaluated by Highways England and used to inform assessment of future projects .	Reporting of quarterly greenhouse gas emissions returns and evaluate data	Highways England	Operation	EMP2 - Requirement 4	Mitigation	Good Practice
Climate	CC006	ES 15.5.19 & ES 15.5.20	Resilience to climate change	The Contractor(s) would design the permanent works in accordance with the design standards identified in Table 2.1 and 2.2 in ES Appendix 15.3 (Application Document 6.3) and use construction materials and products that would be resilient to the effects of projected future climate change in line with UKCP18.	Design and specification of materials resilient to the effects of future climate change	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Climate	CC007	ES 15.5.12 c	Greenhouse gas emissions - operational supply of electricity	Electricity used for operation of the Project would be procured from renewable electricity suppliers	Procurement of renewable electricity for operation of the Project	Highways England	Operation	EMP3 - Requirement 4	Mitigation	Good Practice

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Climate	CC008	ES 15.5.12 d	Low energy lighting	Low energy light sources (for example light-emitting diode (LED) or equivalent technology) would be used within Project lighting systems (subject to emergency lighting requirements) to reduce energy consumption during the operation of the Project and offer a more readily recyclable product at the end of life, compared to traditional light source lamps and luminaires	Use of LED or equivalent technology low energy lighting	Highways England	Operation	EMP3 - Requirement 4	Mitigation	Good Practice
Cultural Heritage	CH001	ES 6.5.14	Physical damage to heritage assets	The draft Archaeological Mitigation Strategy and Outline Written Scheme of Investigation (AMS-OWSI) presented at Appendix 6.9 of the ES (Application Document 6.3) includes details of specifically identified measures to mitigate the impact to known heritage assets and a range of generic mitigation measures from which appropriate mitigation would be applied for currently unknown heritage assets that could be physically damaged by construction. The draft AMS-OWSI will be updated as further information from archaeological evaluation becomes available. The AMS-OWSI sets out the scope of Written Schemes of Investigation (WSIs) to be prepared. The WSIs would define the details of specific mitigation measures for protection or recording of heritage assets which would be implemented before or during construction at locations identified within the AMS-OWSI.	Implementation of mitigation measures set out in the AMS-OWSI approved by the Secretary of State including measures specified in the WSIs and in accordance with Requirement 9 of the DCO.	Contractor	Construction	Requirement 9	Mitigation	Essential
Cultural Heritage	CH002	ES 6.5.12	Management of heritage assets	Cultural Heritage Asset Management Plans (CHAMPs) would be implemented by Highways England in accordance with DMRB LA 116, for any heritage assets that remain within their ownership following construction of the Project.	Ongoing preservation of relevant heritage assets.	Highways England	Operation	EMP3 - Requirement 4	Monitoring	Good Practice
Geology and Soils	GS001	10.5.6 a	Ground investigation	The Contractor would complete further Ground Investigations prior to construction to inform detailed design of the Project. If, during further intrusive ground investigations, drilling is required in areas underlain with contaminated soils, drilling and excavation techniques in line with BS5930 (British Standards Institution, 2020) and BS10175 (British Standards Institution, 2017) would be adopted (e.g. environmental seals) to reduce the risk of creating pollutant pathways. The Contractor would provide Ground Investigation method statements for acceptance of Highways England in consultation with the Environment Agency prior to commencement of the works.	Acceptance of method statement by Highways England in consultation with the Environment Agency	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Geology and Soils	GS002	10.5.6 b	Pre-construction surveys	Prior to any construction compound area being prepared, a pre-condition survey would be undertaken to determine the current land quality across the compound area. A repeat survey would be done after the compounds have been removed to confirm that the area has been returned to its previous condition where reasonably practicable or in line with landowner agreements.	Completion of surveys	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
	GS003			NOT USED						
Geology and Soils	GS004	10.5.6 c	Chemical and fuel storage	Construction site compounds where chemical, waste oils or fuel storage and refuelling activities take place would be managed in line with the following measures: i. Within the construction site compounds, specific areas would be designated for the storage of chemicals, waste oils and fuel and refuelling activities. ii. These designated areas would be bunded to provide capacity for at least 110% of the largest container and placed on hardstanding to prevent downward migration of contaminants. iii. These designated areas would be designed with drainage to include measures for isolating spillages. iv. Any transfer of fuel or other potentially contaminated liquids would only take place within a designated transfer area. v. Drip trays would be provided to reduce the risk of spillages	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Geology and Soils	GS006	10.5.6d	Materials management	All excavated materials and soils proposed for re-use under a Materials Management Plan would be required to meet risk-based acceptability criteria applicable to its intended use. The procedures and criteria to be used would be set out in the Materials Management Plan (REAC ref. MW007) prior to commencement of that part of the works.	Compliance with the Materials Management Plan	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
	GS007			NOT USED						
	GS008			NOT USED						
	GS008			NOT USED						
Geology and Soils	GS009	10.5.6e	Soil management	Soils would be handled and stored to allow their sustainable re-use in line with the Defra Construction Code of Practice for the Sustainable Use of Soil on Construction Sites (2009) and the MAFF Good Practice Guide for Soil Handling (2000). Full details of the soil resources present and the procedures for soils management (covering vegetation clearance, setting out haul routes, soil stripping, stockpile creation and management, soil reconditioning (where required) and soil re-use) would be set out prior to any soil stripping works commencing, covering all proposed end uses (eg agricultural land, woodland or other habitat types).	Approval of the procedures for soils management by Highways England	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Geology and Soils	GS010	10.5.6 f	Soil management	Characterisation of the existing soil to determine its resilience to handling and stripping depths would be based on detailed soil surveys. Where information is not available (i.e. from the detailed ALC surveys), pre-construction soil surveys would be carried out by the Contractor to inform the development of appropriate soils management procedures.	Implementation of the procedures for soils management approved by Highways England	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Geology and Soils	GS011	10.5.6 g	Soil management	Land required temporarily during the construction phase would be reinstated to support the required end use in-line with land use identified on the Environmental Masterplan. The full soil profile, in accordance with the soil re-use requirements in the soils management procedures (REAC ref. GS009), will be recreated in the correct sequence of horizons, in such a manner that there are good remaining fissures to facilitate soil profile drainage and plant root development.	Implementation of the procedures for soils management approved by Highways England	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Geology and Soils	GS012	10.5.6 h	Soil management	Reinstatement of soils affected by temporary works would aim to avoid any reduction in soil function. For agricultural land this will be measured by the quality of the land as defined by the ALC system (with a soil profile recreated to 1.2m below ground level where this was the pre-construction soil depth). For areas of landscape planting or habitat creation this will be measured by the successful restoration of the soil profile (both physical and chemical characteristics) defined for that particular habitat in the soils management procedures suitable to allow the establishment and long-term health of the habitat.	Implementation of the procedures for soils management approved by Highways England	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Geology and Soils	GS013	10.5.6 i	Soil management	Procedures for the management of soil resources would include provisions for: i. Ensuring soils are stripped and handled in the driest condition practicable. ii. Ensuring topsoil and subsoil resources are stripped and stockpiled separately iii. Keeping records of excavated and stored soils. iv. Confining vehicle movements to defined haul routes until all the soil resource has been stripped. v. Protection of stockpiles from erosion through establishment of a grass cover unless the soil materials are to be re-used in a short timeframe (<60 days) in which case alternative erosion control measures may be required, such as silt fencing or the use of geotextile blankets vi. Protection from tracking over using signage or fencing. vii. Ensuring the physical condition of the replaced soil profile to at least 1.2m below ground level and that is sufficient for the post-construction use. viii. The use of toolbox talks to inform all those working on the site of the requirements for soil handling, storage and re-use.	Implementation of the procedures for soils management approved by Highways England	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Geology and Soils	GS014	ES 10.5.6 j	Soil management	Following soil reinstatement there would be a 5 year aftercare period during which defects would be corrected. The Contractor would prepare and present to Highways England for acceptance, a schedule of aftercare monitoring, maintenance and defect correction, to include soil testing, appropriate to the target specification (e.g. land grade where restoration is to agricultural use or specific characteristics where restoration is to support habitat creation or re-provision.) Implementation of the aftercare monitoring, maintenance and defect correction will be overseen by an Environmental Clerk of Works.	Implementation of commitment actions	Highways England	Construction	EMP2 - Requirement 4	Mitigation	Essential
Geology and Soils	GS015	10.5.6 k	Soil management	The Contractor would have in place an agricultural liaison officer or named deputy who shall be contactable by telephone 24 hours a day, 7 days a week during construction activities on agricultural land.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Geology and Soils	GS016	10.5.6 l	Contamination verification	A verification report would be prepared by the contractor after completion of work to remediate contamination at each site where this is undertaken. This would identify the locations of the remediation works undertaken and the final tested ground quality. These reports would be provided to the relevant local authority and Environment Agency as a record.	Submission of verification reports to the relevant local authority and Environment Agency	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Geology and Soils	GS017	10.5.7 a	Contamination verification	The findings of the verification report (REAC ref. GS016) would be available for inclusion within the operations Health and Safety file or equivalent.	Implementation of commitment actions	Highways England	Operation	EMP3 - Requirement 4	Mitigation	Good Practice
Geology and Soils	GS018	10.5.6 m	Gas management	The ground gas regime across the Project and especially in close proximity to landfill sites would be investigated to inform design of enclosed and confined spaces (e.g. service ducts/boxes) to reduce the risk to human health (asphyxiation) and buildings or structures (explosion). No confined spaces associated with the Project would be accessible to the public.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Geology and Soils	GS019	10.5.7 b	Contamination	If any incident were to occur which resulted in localised contamination, soils which had become significantly affected would be assessed and if necessary removed to reduce the risk of contamination migrating across a wider area or entering controlled waters.	Implementation of commitment actions in accordance with standard Highways England operating procedures	Highways England	Operation	EMP3 - Requirement 4	Mitigation	Good Practice

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Geology and Soils	GS020	10.5.10 a	East Tilbury haul road	A temporary access route would be created across East Tilbury landfill site for the ecology translocation to land to the east of the Project. The temporary access route would be designed to safeguard the capping layer on the landfill and minimise the risk of liquid waste being brought to the surface by the consolidation of the ground along the temporary access route. The design would be agreed with the Environment Agency prior to installation. Vehicle movements and the type of vehicles (tonnage) would be restricted to further reduce the risk of damaging the integrity of the cap and the wider environment. The temporary access route will be removed as soon as it is no longer required for ecological management purposes.	Design of the temporary access route would be agreed with the Environment Agency.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Geology and Soils	GS021	10.5.10 b	North Portal	Leachate from the East Tilbury landfill could be drawn towards the construction area of the North Portal and ramps due to the level of groundwater control required during excavation works. This would be mitigated through the construction of a deep barrier around the excavations to reduce groundwater ingress. The depth of the barrier walls would be informed by the results of modelling and consultation with the Environment Agency prior to the commencement of excavation works to construct the North Portal box structure and ramps. The need for any supplementary mitigation measures and any necessary monitoring would be informed by the results of modelling and consultation with the Environment Agency prior to the commencement of excavation works. Technical solutions would be developed by the Contractor following further investigation and assessment. Potential solutions could include i. Ground treatment such as grouting to form a low permeability plug below the depth of excavation to reduce the risk of water inflow. ii. Construction of a slurry cut-off wall immediately west of the East Tilbury Landfill to decrease the permeability of the ground to lessen the risk of contaminant mobilisation and saline intrusion. iii. Potential to reduce the footprint of the structure by optimising the tunnel bore spacing and layout of the TBM launch structure. iv. Creating a hydraulic barrier in the chalk between the East Tilbury Landfill and the excavated area, by recharging the chalk aquifer with some of the abstracted groundwater (subject to its quality)	Implementation of measures agreed with the Environment Agency to prevent mobilisation of leachate and saline intrusion	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Geology and Soils	GS022	10.5.10 c	North Portal	Dewatering may be required during excavation works which could potentially cause waterborne contaminants to mobilise and flow in the groundwater towards the excavation. If dewatering is required, then the Contractor would treat groundwater from dewatering works to standards agreed with the Environment Agency before discharge under licence.	Compliance with terms of Environment Agency discharge licence	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Geology and Soils	GS023	10.5.10 d	North Portal	The North Portal is located within an area historically used for landfill. Groundwater control during the excavation and construction activities for the tunnel boring machine (TBM) launch may cause an increased volume of gases to escape as soils, made ground and underlying alluvium become unsaturated. In addition, drilling through the area of historic landfill could lead to a build-up of gases behind the TBM. These factors would be considered during the detailed design to establish appropriate and safe procedures and working methods to construct the tunnel and North Portal. Gas monitoring will be undertaken during the construction for the launch and use of the TBM to detect changes in the gas regime as a safeguard to protect construction workers.	Compliance with relevant Health and Safety legislation and the CDM Regulations	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Geology and Soils	GS024	10.5.10 e	Ground improvement tunnel	The design of the main crossing TBMs may require the construction of a ground improvement tunnel beneath the Thames Estuary and Marshes Ramsar site. The Environment Agency would be consulted on measures to reduce the risk of blow out and spreading of grout during tunnelling if a ground improvement tunnel is required.	Agreement of risk control procedures with Highways England in consultation with the Environment Agency	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Geology and Soils	GS025	10.5.10 f	CA05 ground gas	Accommodation and welfare facilities are proposed within construction compound CA05 which would service the North Portal construction activities. Ground gas associated with the historic landfill sites which may be present in the area could pose a risk to health. Prior to the accommodation being constructed, a gas assessment (investigation and monitoring) would be undertaken in the area to determine the need for appropriate gas protection measures.	Acceptance by Highways England of the gas assessment report	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Geology and Soils	GS026	10.5.10 g	Foundation works risk assessment	Construction of foundations has the potential to create pollution pathways and mobilise contaminants. The Contractors would prepare a foundation risk assessment report in line with the outline foundation works risk assessment presented in ES Appendix 10.5 (Application Document 6.3) during detailed design specific to structures and ground conditions. This would be submitted to Envornment Agency for review prior to commencement of that part of the works to which the report relates.	Acceptance of foundation risk assessment report by Highways England in consultation with Environment Agency	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Geology and Soils	GS027	10.5.10 h	Remediation strategy	The Contractor would develop proposals for site-specific remediation in consultation with the relevant Local Authority prior to implementation. The Contractor would have regard for the Outline Remediation Strategy within ES Appendix 10.3 (Application Document 6.3) which identifies techniques that could be implemented by the Contractor for the remediation of contamination.	Acceptance of site remediation proposals by Highways England in consultation with the relevant local authority	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Geology and Soils	GS028	10.5.10 i	Remediation of contamination	The construction works would include the removal of vegetation, stripping of topsoil, excavation and earth movements. These activities could cause the spreading and mobilisation of contaminants. i. During earth movement works, a watching brief protocol would be implemented under the supervision of an Environmental Clerk of Works. ii. Site workers would be vigilant to ensure visual or olfactory signs of contamination are noted and that contaminated soil is kept separate from other materials.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Geology and Soils	GS029	10.5.10 j	Long term temporary stockpiles	Surplus clean chalk soils generated from construction works south of the River Thames are proposed to be stockpiled to facilitate control of offsite HGV traffic. The stockpiles of surplus clean chalk would be designed to safeguard the underlying soils and groundwater and the design would be agreed with the Environment Agency prior to stockpiling commencing.	Implementation of environmental management measures agreed with the Environment Agency	Contractor	Construction	Protective Provisions – Schedule 14	Mitigation	Essential
Geology and Soils	GS030	10.5.10 k	Temporary road location	A temporary access road is proposed across the former Esso petrol station on the northside of the A2/M2 junction. This is to provide access to construction compound CA02. The former petrol station is identified in ES as a high-risk site due to contamination. However, prior to construction of the access road, the Environment Agency would be consulted on the alignment of the road to ensure that potential disturbance of residual contamination present in this area is avoided so as not to disturb any ongoing remediation works in this area.	Highways England to agree temporary road alignment in consultation with the Environment Agency	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Geology and Soils	GS031	ES 10.5.10 l	Low Street Pit potential local geological site.	Low Street Pit has been identified as a potential local geological site due to the presence of Mucking Gravels. The Project has the potential to impact the Mucking Gravels during the construction of the Tilbury viaduct and the associated embankment earthworks and drainage, as well as due to the required diversion of statutory undertakers' impacted apparatus, which are located within the Low Street Pit. Construction activities on the eastern side of Low Street Pit, where an area of Mucking Gravels is present, would be restricted to prevent any excavations of the Mucking Gravels in this area and retain the existing eastern quarry slope. Figure 4 Annex 1, Appendix 10.10, of the Environmental Statement (Application Document 6.3) shows the area that would be subject to these restrictions.	No excavation of Mucking Gravel in the identified area unless otherwise approved by the Secretary of State.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
HRA	HR001	HRA	Seasonal constraints to construction of discharge from construction of South Portal	Works within the Thames Estuary and Marshes Ramsar to construct the infrastructure for discharge of water into the Ramsar during construction of the South Portal would be undertaken during April, May, June and July only to avoid disturbance to passage and overwintering birds associated with European designated sites unless otherwise agreed with SoS in consultation with Natural England.	Implementation of commitment action	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
HRA	HR002	HRA	Seasonal constraints to works at the Jetty and northern outfall	Works within the intertidal area to maintain and decommission East Tilbury Jetty and the construction or any decommissioning of the northern outfall would be undertaken during April, May, June, July and August only to avoid disturbance to passage and overwintering birds associated with European designated sites unless otherwise agreed with SoS in consultation with Natural England.	Implementation of commitment action	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
HRA	HR003	HRA	Response to extreme weather	To avoid impacts to wintering birds during prolonged periods of sub-zero temperatures, works within 300m of intertidal areas, or that would result in noise levels above 55dB within intertidal areas, will be stopped during severe weather conditions. Between November to February a cold weather ban would be implemented if highest daytime temperatures remain below 0^0c for 5 consecutive days then works described above will stop and restart once conditions have warmed up to above 0^0c.	Implementation of commitment action	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV001	ES 7.5.16	Trees and vegetation, utilities	Detailed design for the alignment of diverted utilities to avoid trees and vegetation as far as reasonably practicable, and in accordance with the landscaping scheme as approved by the SoS.	Acceptance by Highways England of tree removal drawings prior to commencement of utility diversion works within order	Contractor	Construction	Landscaping scheme - Requirement 5	Mitigation	Essential
Landscape	LV002	ES 7.5.10	Land reinstatement	Land temporarily impacted by works to divert utilities would be reinstated to its former condition and composition upon completion, as far as reasonably practicable, unless otherwise specified in the Environmental Masterplan.	Successful reinstatement of vegetation at these locations within 12 months for grassland, 24 months for hedgerows and 5 years for	Contractor	Construction	Landscaping scheme - Requirement 5	Mitigation	Good Practice
Landscape	LV003	ES 7.5.11	Landscape maintenance	The first five years of vegetation establishment would be overseen by an Environmental Clerk of Works. Vegetation that has failed to establish would be replaced as soon as identified within the next available planting season.	Successful establishment of planting within five years to serve its mitigation purpose as identified on the Environmental Masterplan.	Contractor	Construction	Landscaping scheme - Requirement 5	Monitoring	Good Practice
Landscape	LV004	ES 7.5.10	Planting	Where guards are used to protect seedlings and whips, the use of plastic tree guards would be avoided in favour of biodegradable options where available.	Avoidance of litter from broken or abandoned tree guards	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Landscape	LV005	ES 7.5.16	Siting of construction compounds	No main compounds, as defined in the project description presented in ES Chapter 2 (Application Document 6.2) would be located within the Kent Downs AONB.	Highways England acceptance of construction compounds locations	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV006	ES 7.5.16	Compound CA01, Views, Valley Drive, Mackenzie Way	Construction compound facilities greater than 5m in height would be located as southerly as reasonably practicable to maximise the distance from residential properties on Valley Drive and Mackenzie Way and minimise visual prominence.	Highways England acceptance of the layout of buildings within construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Landscape	LV007	ES 7.5.16	Compound CA02. Construction compounds facilities,	Construction compound facilities greater than 5m in height would be located to maximise distance from nearby residential properties on Thong Lane and from the Kent Downs AONB, as far as reasonably practicable.	Highways England acceptance of the layout of buildings within construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV008	ES 7.5.10	Compound CA03, Bund,	Earth bunds of approximately 5m in height formed from material excavated on site would be sited along the boundary of the compound to facilitate screening for residential properties on Thong Lane and Gravesend Road (A226) during construction.	Highways England acceptance of the location of stockpiles within construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Landscape	LV009	ES 7.5.16	Compound CA03, Stockpile slopes	Softening the appearance of temporary earthwork stockpiles adjacent to the Kent Downs AONB by phasing the works to be such that east facing slopes are retained as grass seeded slopes for continuity of appearance and screening purposes for as long as reasonably practicable.	Implementation of commitment actions.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV010	ES 7.5.16	Compound CA03, Construction compound facilities,	Construction compound facilities greater than 5m in height would be located to maximise distance from high density residential areas as far as reasonably practicable .	Highways England acceptance of the layout of buildings within construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV011	ES 7.5.10	Compound CA03a, Bunds	Earth bunds of 3m in height would be formed from material excavated and retained on site to facilitate screening for residential properties on Castle Lane.	Highways England acceptance of the location of stockpiles within construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Landscape	LV012	ES 7.5.16	Compound CA03a, Construction compound facilities	Construction compound facilities greater than 5m in height would be located as easterly as reasonably practicable to maximise distance from residential properties on Castle Lane.	Highways England acceptance of the layout of buildings within construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV013	ES 7.5.10	Compound CA05, Bunds	Where soil is excavated and retained on site temporarily, it would be stockpiled in the form of an earth bund to facilitate screening for residential properties along Fort Road at the urban edge of Tilbury.	Highways England acceptance of the location of stockpiles within construction compounds.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Landscape	LV014	ES 7.5.16	Compound CA05, Construction compound facilities, Readmans	Concrete batching plant and segment factory would be located adjacent to Readmans Industrial Estate.	Highways England acceptance of the layout of buildings and concrete batching plant within construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV015	ES 7.5.10	Compound CA05a, Bunds	Where soil is excavated and retained on site temporarily, it would be stockpiled in the form of earth bunds to facilitate screening for residential properties along Church Road.	Highways England acceptance of the location of stockpiles within construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Landscape	LV016	ES 7.5.16	Compound CA05a, Construction compound facilities	Construction compound facilities greater than 5m in height would be located at the south of the compound, adjacent to compound CA05, where reasonably practicable, to maximise distance from residential properties on Church Road.	Highways England acceptance of the layout of buildings within construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV017	ES 7.5.10	Compound CA06, Bunds	Where soil is excavated and retained on site temporarily, it would be stockpiled in the form of earth bunds to facilitate screening for residential properties within Chadwell St Mary where reasonably practicable.	Highways England acceptance of the location of stockpiles within construction compounds.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Landscape	LV018	ES 7.5.16	Compound CA06, Compound construction facilities	Construction compound facilities greater than 5m in height would be located at the south of the compound, adjacent to compound CA05, as far as reasonably practicable, to minimise visibility from residential properties at Chadwell St Mary.	Highways England acceptance of the layout of buildings and concrete batching plant within construction compounds.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV019	ES 7.5.16	Compound CA10, Construction compound facilities	Construction compound facilities greater than 5m in height would be located as westerly as reasonably practicable, to maximise distance from residential properties on Stifford Clays Road and Fen Lane.	Highways England acceptance of the layout of buildings within construction compounds.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV020	ES 7.5.16	Compound CA11, Construction compound facilities	Construction compound facilities of greater than 5m in height would be located as north easterly as reasonably practicable to minimise visibility from residential property (Hobletts).	Highways England acceptance of the layout of buildings within construction compounds.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV021	ES 7.5.10	Compound CA11, Bund	Where soil is excavated and retained on site temporarily, it would be stockpiled in the form of earth bunds to facilitate screening for residential properties to the south.	Highways England acceptance of the location of stockpiles within construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Landscape	LV022	ES 7.5.16	Compound CA14, Construction compound facilities	Construction compound facilities of greater than 5m in height would be located as westerly as reasonably practicable to maximise the distance from the North Ockendon Conservation Area.	Highways England acceptance of the layout of buildings within construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential

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Landscape	LV023	ES 7.5.16	Compound CA14, Construction compound facilities,	It is anticipated that a concrete batching plant would be located within this compound. This facility would be located as south westerly as far as reasonably practicable, to maximise distance from the North Ockendon Conservation Area.	Highways England acceptance of the layout of buildings and concrete batching plant within construction compounds	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV024	ES 7.5.10	Compound CA14, Bunds	Where soil is excavated and retained on site temporarily, it would be stockpiled as earth bunds to facilitate screening for the North Ockendon Conservation Area.	Highways England acceptance of the location of stockpiles within construction compounds.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Landscape	LV025	ES 7.5.16	Compound CA15A, Construction compound facilities	Construction compound facilities of greater than 5m in height would be located as north westerly as reasonably practicable to minimise visibility from residential properties within the caravan park on Ockendon Road.	Highways England acceptance of the layout of buildings within construction compounds.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV026	ES 7.5.10	Compound CA15A, Bunds	Where soil is excavated and retained on site temporarily, it would be stockpiled in the form of earth bunds to facilitate screening for Ockendon Road and the nearest residential properties at the caravan park.	Highways England acceptance of the location of stockpiles within construction compounds.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Landscape	LV027	ES 7.5.16	Compound CA16, Construction compound facilities	Construction compound facilities of greater than 5m in height would be located adjacent to the M25, as far as reasonably practicable.	Highways England acceptance of the layout of buildings within construction compounds.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV028	ES 7.5.16	Protection of retained vegetation	An Arboricultural Method Statement and Tree Protection Plan would be prepared in accordance with BS 5837:2012 identifying measures for the protection of retained vegetation prior to the commencement of site clearance works. These measures would be complied with during construction and all works to trees and vegetation removal would be implemented under the supervision of the Environmental Clerk of Works.	Implementation of measures for the protection of retained vegetation and avoidance of harm to retained vegetation.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV029	ES 7.5.16	Landscape and Ecology Management Plan	The Landscape Scheme prepared in accordance with Requirement 5 of the DCO would include a Landscape and Ecology Management Plan (LEMP).	Clearly defined approach to deliver successful establishment of vegetation as set out in the Environmental Masterplan	Contractor	Construction	Landscaping scheme - Requirement 5	Mitigation	Essential
Landscape	LV030	ES 7.5.16	Veteran and ancient tree fencing	In accordance with standing advice prepared by Natural England and the Forestry Commission (2018), the following measures would be developed to protect veteran trees, ancient trees and ancient woodland identified on the Environmental Masterplan: 1. Screening barriers would be provided to protect retained ancient trees, ancient woodland and veteran trees from dust and pollution from nearby works. Locations of barriers will be defined in accordance with the requirements set out in REAC item LV028. 2. A buffer zone would be defined to avoid impact on root zones. These would be as follows: - For veteran trees, the buffer would be a minimum of 15 times the diameter of the tree trunk or five metres beyond the canopy, whichever is the greater - For ancient trees and ancient woodland, a separation distance of 15m from the canopy of the ancient trees/woodland edge would be maintained between the proposed construction activity and the asset. These measures would be followed by the contractor unless specifically agreed by Highways England, following the advice of a qualified arboriculturist, and following non-invasive root investigations which have determined that a smaller buffer would be appropriate to the tree or woodland.	Clearly defined approach to deliver successful establishment of vegetation as set out in the Environmental Masterplan	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV031	ES 7.5.16	Relocating lost veteran trees	Where removal of dead wood or veteran trees is required, the intact hulks of felled veteran trees would be relocated in close proximity to a nearby veteran tree, woodland or parkland area in accordance with standing advice prepared by Natural England and the Forestry Commission (2018). Dead wood would be placed within the woodland within which is located, in log piles and left to decompose naturally. This would provide opportunity for invertebrates and fungi resident within the tree to relocate. The location for the placement of the hulk will be identified following liaison with the relevant local planning authorities and be supervised by a qualified arboriculturist.	Relocation of intact tree hulks in accordance with NE and FE guidance	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Landscape	LV032	ES 7.5.16	Veteran tree replacement	A minimum of 30 individual specimen trees would be planted as replacement for 10 lost veteran trees. 15 such trees would be planted to the south of the River Thames and 15 to the north of the River Thames, to reflect the equal split of lost trees on either side of the River. The location, stock size and species selection would be agreed with the Secretary of State following consultation with the relevant local planning authorities. Suitable species could include a combination of Oak (Quercus robur) and Sweet Chestnut (Castanea sativa). This would be undertaken during the construction phase within locations selected to allow sufficient open space for establishment of an open crown, whilst being as close as reasonably practicable to the location of the lost existing veteran trees to provide some ecological connection with other veterans nearby.	Implementation of the landscaping scheme approved by the SoS	Contractor	Construction	Landscaping scheme - Requirement 5	Mitigation	Essential

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Landscape	LV033	ES 7.5.16	Veteran tree pruning	All potential veteran trees that may be affected by the Project would be assessed to verify veteran designation in accordance with the recommendations of the Arboricultural Impact Assessment (ES Appendix 7.12 , Application Document 6.2) prior to the commencement of site clearance works. Where it would be beneficial to reduce the fragmentation of veteran trees within the Order Limits, targeted veteranisation pruning would be undertaken on potential veteran trees retained within the Order Limits.	Identification of veteran trees. Veteranisation pruning where this would reduce fragmentation.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Marine Biodiversity	MB001	ES 9.5.9 e	Construction of water management pipeline and outfall	Works to maintain and decommission the East Tilbury Jetty, and to construct the water management pipeline and outfall, including any piling, must not be undertaken when the work area is either fully submerged, or partially covered by water where this would result in the transmission through the water column of noise and vibration or the generation of suspended sediments in accordance with the conditions set out by the Marine Management Organisation (MMO) in the Deemed Marine Licence.	Compliance with conditions of the Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15	Mitigation	Essential
Marine Biodiversity	MB002	ES 9.5.9 e i	Piling below mean high water spring	Techniques such as soft start / ramp-up would be utilised for the first 20 minutes of piling operations and should piling activities cease for more than 10 minutes, the soft start/ramp-up technique be repeated. Vibro-piling will be used until first refusal; thereafter impact piling being used to toe in the piles. Hammer energy would be reduced once an acceptable drive rate is observed.	Compliance with conditions of the Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15	Mitigation	Essential
Marine Biodiversity	MB003	ES 9.5.9 f i	Lighting during construction below mean high water spring	Prior to the commencement of works below mean high water springs, proposals for lighting of marine construction works subject to the Deemed Marine Licence that require 24 hour working will be developed and submitted to the MMO. This would include an assessment of the effects of measures such as directional lighting and controls on lux levels to mitigate effects on waterfowl during 24-hour operations.	Compliance with Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15	Mitigation	Essential
Marine Biodiversity	MB004	ES 9.5.9 g i	Bird survey	An annual bird survey will be undertaken whilst works are being carried out in the area below mean high water springs . The survey will be undertaken between 01 September and 31 March inclusive and to a specification submitted to the MMO.	Compliance with Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15	Monitoring	Essential
Marine Biodiversity	MB005	ES 9.5.9 g ii	Sediment level survey	An annual sediment level survey for an area up and downstream will be undertaken whilst works are being carried out in the area below mean high water springs to a specification submitted to the MMO.	Compliance with Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15	Monitoring	Essential
Marine Biodiversity	MB006	ES 9.5.9 h	Implementation invasive species introduction controls	A biosecurity risk assessment and method statement will be developed and implemented in line with the International Convention for the control and management of ships' ballast water and sediment (adopted in 2004; entry into force in 2017). This will outline the risks and control measures for managing the introduction of invasive non-native species.	Compliance with Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15	Mitigation	Essential
Material assets and waste	MW001	ES 11.5.17 a	Preferentially avoiding use of primary materials	1. Where design specification permits, key construction materials used would include a measurable recycled or secondary content. 2. In line with the target set out in DMRB LA 110, 31% of aggregates used in construction would be recycled or secondary, for those applications where it is technically and economically feasible to substitute these alternative materials for primary aggregates. To facilitate compliance with this target, the Contractor would calculate the total aggregate required to achieve the detailed design, and the total where design specification dictates only primary aggregate is used. During construction, the Contractor would record the amount of primary and secondary/recycled aggregate by weight and calculate compliance with the target (offsetting the amount excluded by design specification). 3. In line with the target set out in DMRB LA 110, 70% recycling and reuse on site of suitable, uncontaminated concrete from demolition activities to substitute use of primary material. 4. Suitable uncontaminated concrete from demolition and construction activities would be processed to achieve non waste status e.g in accordance with the Aggregates from Inert Waste Quality Protocol (WRAP, 2013).	Implementation of commitment actions.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Material assets and waste	MW002	ES 11.5.17 b	Responsible sourcing	1. Priority would be given to sourcing primary, secondary and recycled aggregates from Kent, Essex and Greater London whenever the design specification permits and supply is available to embody the proximity principle. 2. The Contractor would use the BRE Framework Standard for Responsible Sourcing (BES 6001) (BRE, 2008), to verify imported materials are sustainably sourced and managed, to reduce the impacts throughout the supply chain.	Implementation of commitment actions.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice

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Material assets and waste	MW003	ES 11.5.17 c	Components standardisation	The Contractors would be required to review the design and investigate opportunities to standardise (where reasonably practicable) construction components such as beam depths, abutment sizes and piers to increase efficiency of materials use in production and reduce waste production. This initiative would be progressed through detail design and documented in a material efficiency design report submitted to Highways England prior to construction.	Acceptance by Highways England of the material efficiency design report for works under the control of Highways England and its contractors	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Material assets and waste	MW004	ES 11.5.17 d	Design for off-site construction	The Contractors would be required to review the design to investigate the use of pre-fabricated structures and components and encourage a process of assembly rather than construction on site where economically and technically feasible.	Contractors to submit reports for Highways England review and acceptance prior to construction for works under the control of Highways England and its contractors	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Material assets and waste	MW005	ES 11.5.17 e	Pre-demolition surveys	Undertake pre-demolition surveys of any structures and buildings. Demolition materials would be identified and quantified including potential sources of recycled aggregate to be reused on site, as well as hazardous materials such as asbestos.	Completion of pre-demolition surveys	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Material assets and waste	MW006	11.5.18 e	Site waste manager	During both detailed design and construction, Contractors would appoint a materials and waste manager to ensure that the waste hierarchy is implemented and opportunities are identified and implemented to reduce waste generation or improve recovery/recycling rates are identified . The materials and waste manager would be responsible for ensuring compliance with waste mitigation requirements set out in the REAC and ensuring the Site Waste Management Plan or equivalent procedures (REAC ref. MW009) are written and updated.	Acceptance by Highways England of the manager for materials and waste nominated by the Contractor for works under the control of Highways England and its contractors.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Material assets and waste	MW007	11.5.18	Re-use of excavated materials and soils	1. Excavated material would be managed in line with the waste hierarchy with preference given to reuse where feasible and the design allows. 2. Clean, naturally occurring soils would be reused on-site in line with Directive 2008/98/EC on Waste (Waste Framework Directive), Article 2. 3. Contractors would implement all required environmental permits, exemptions and a Materials Management Plan (in accordance with the Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011) for the reuse of made ground and contaminated soils. 4. Material that are not suitable for reuse or is excess to requirements would likely be managed as waste.	Compliance with Material Management Plan and Duty of Care Requirements	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Material assets and waste	MW008	11.5.21 a	Characterisation of excavated fill	A ground investigation would be used to identify material that would be excavated on site that could be used as Class I-IV fill materials or construction aggregate to reduce the need to import equivalent materials it more detail.	Completion of ground investigation for works under the control of Highways England and its contractors	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Material assets and waste	MW009	11.5.18 d	Site waste management procedures	The Contractors would produce Site Waste Management Plans (SWMP) or equivalent to set out procedures for the characterisation, management and monitoring of wastes arising on site. This would include procedures for: i. Initial forecasting of construction waste listed by waste type, waste code, source and anticipated weight from detailed design. ii. Real time calculation of construction waste listed by waste type, waste code, source iii. Keeping records for waste arisings including final destination and, where relevant, off-site destination i.e. reuse, recycling, recovery or disposal. iv. Calculation of the reuse of site won materials. v. Calculation of on-site recycling and reuse of demolition materials for reuse as recycled aggregate. vi. Calculation of off-site reuse of inert excavated materials. vii. Calculation of overall construction waste diverted from landfill. viii. Keeping records of relevant Duty of Care documentation (waste carrier registration, receiving site environmental permit number, waste transfer documentation reference) associated with the waste movement. The SWMP would be compatible with materials tracking element required as part of a MMP to allow the full traceability of all materials excavated during construction. (REAC item MW007 refers).	Acceptance by Highways England of procedures for management of wastes arising on site for works under the control of Highways England and its contractors.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice

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Material assets and waste	MW010	11.5.18 f	Site waste management	Contractors would implement the following measures during construction in order to enhance recovery and recycling rates and minimise the quantities of waste: 1. All waste arisings would be characterised and recorded 2. All wastes would be classified, with mirror entry code wastes sampled to determine classification, in line with the prevailing technical guidance. 3. Waste management off-site would be completed under Duty of Care (Section 34 Environmental Protection Act). All waste would be transported using licensed carriers and taken only to appropriately permitted facilities. All waste movements would be accompanied by waste documentation such as Waste Transfer or Consignment Notes (dependent of waste class) which would be retained for the appropriate legal period. 4. Satisfy the legal need under the Waste (England and Wales) Regulations 2011 (as amended) for pre-treatment of waste and confirm this in a written declaration on the associated waste documentation. 5. Demonstrate and document that sufficient space has been allowed within the construction working areas for stockpiles for; topsoil, contaminated material (for later off-site management), materials to be reused, excess clean material and imported materials for construction. This would enable the segregation of waste types, prevent the mixing of hazardous and non-hazardous wastes and enhance recovery rates by minimising degradation, damage and loss. 6. Segregate hazardous and non-hazardous waste, separating waste at source by type, where reasonably practicable, providing separate skips for general waste, metal, dry recycling and timber as a minimum at each compound. Suitable provision would also be made for common hazardous wastes e.g. used absorbents, aerosol cans, oily rags and waste electronics.	Implementation of site waste management procedures and Duty of Care obligations	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Material assets and waste	MW010 (continued)	11.5.18 f		7. Provide impermeable surfaces with sealed drainage for remediation, quarantine and hazardous waste storage areas to minimise cross contamination of other waste streams and surrounding ground. 8. Label stockpiles and skips with contents, to prevent the mixing of hazardous and non-hazardous wastes. 9. Comply with any specific waste storage and handling requirements required by legislation: e.g. for asbestos or waste electronics. 10. Vegetation waste should be reused on site wherever possible e.g. for ecological mitigation (unless contaminated by invasive species). 11. Where possible agree with material suppliers to reduce the amount of packaging on materials or to participate in a packaging take-back scheme. 12. Implement a material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste. 13. Monitor material quantity requirements to avoid over-ordering to reduce opportunity for oversupply and damage on site which would generate waste materials. 14. Prioritise off-ground storage e.g. on pallets, retention of materials in original packaging, protection from rain and collision by plant or vehicles. 15. Ensure that the storage of lightweight or liquid/sludge waste materials will prevent dispersion by wind and precipitation. 16. Seal stockpiles in place for over 30 days to maintain integrity of material. 17. Seed topsoil stockpiles to reduce soil loss and maintain soil quality. 18. Prohibit the burning of waste and unwanted materials on-site. 19. In line with the requirements of DMRB (LA 110), enhancement opportunities would be identified, reported and implemented during detailed design and construction to minimise the demand for material and the amount of waste sent for final disposal in landfill.	Implementation of site waste management procedures	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Material assets and waste	MW011	11.5.22 a i	Re-use of materials	The Contractor would seek to achieve a target that 95% (by weight) of inert excavated materials destined for off-site waste management outside the Order Limits would be diverted from final disposal in landfill .	No more than 5% (by weight) of waste inert excavated materials would be placed in landfill.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Material assets and waste	MW012	11.5.22 a ii	Re-use sites	The Contractor would use the methodology in the Excavated Materials Assessment within ES Appendix 11.1 (Application Document 6.3) to identify re-use sites that score positively against the sustainability scoring system presented in that document.	Implementation of commitment actions for works under the control of Highways England and its contractors	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Material assets and waste	MW013	11.5.22 b	Recycling and recovery of materials	The Contractor would use the methodology in the Waste Framework Directive (2008/98/EC) to demonstrate the recovery of non-hazardous construction waste, with a target of 90%. The Contractor would achieve a minimum recovery of 70% (by weight).	Achievement of specified target for works under the control of Highways England and its contractors	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Material assets and waste	MW014	11.8.4	Monitoring operational phase	The road operator would provide a summary of materials used and waste generated during the first year of operation in line with requirements of DMRB, LA 110, Material Assets and Waste. This information would be reviewed against the forecast presented in ES Chapter 11, Material assets and waste (Application Document 6.3) and used to update the Environmental Management Plan for future operational years.	Reporting of first year operational demand for materials and waste generation	Highways England	Operation	EMP2 - Requirement 4	Monitoring	Good Practice

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Material assets and waste	MW015	11.5.22 a iii	Hazardous construction waste disposal	The Contractor would seek to achieve a target of 70% (by weight) of hazardous construction waste to be diverted from landfill. It is anticipated that this would be achieved by undertaking remediation or treatment within the Order Limits or off site at third party facilities. It is acknowledged that the nature of some hazardous construction waste may preclude this. Where a hazardous construction waste cannot be diverted from landfill, the justification and evidence will be provided by the Contractor and logged by the Contractor in the SWMP.	Achievement of specified target for works under the control of Highways England and its contractors	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Noise and vibration	NV001	ES 12.5.12 a i	Noise and Vibration level controls	Noise and vibration levels would be controlled in accordance with BS5228 to reduce disturbance to the environment and communities in the vicinity of the construction works.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Noise and vibration	NV002	ES 12.5.12 b i	Noise and Vibration Plan	A Noise and Vibration Management Plan or equivalent (NVMP) would be prepared for each part of the construction works subject to Section 61 control for consideration by the relevant planning authority.	Approval of NVMP or equivalent by the SoS in consultation with local planning authority	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Noise and vibration	NV003	ES 12.5.12 c i	Conveyor systems	A maintenance programme which includes inspection of the conveyor equipment would be implemented to reduce noise and vibration.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Noise and vibration	NV004	ES 12.5.12 d i	Section 61 Consents	Where appropriate, consents would be obtained from the relevant local authorities under Section 61 of the Control of Pollution Act 1974 (which may include noise and vibration limits where relevant) for the proposed construction works.	Compliance with the terms of Section 61 consents	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Noise and vibration	NV005	ES 12.5.12 e i	Baseline noise levels	Pre-construction baseline noise levels would be submitted to the relevant planning authority to establish a pre-construction baseline for monitoring compliance with construction noise limits.	Acceptance by the EHO for relevant planning authorities on baseline levels to inform Section 61 consents	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Noise and vibration	NV006	ES 12.5.12 f i	noise assessment	Construction works would be assessed in accordance with BS 5228 using specific manufacturer's data and proposed position of equipment. Results of the assessment would be presented to the Environmental Health Officers of the relevant planning authorities prior to commencement of that part of the construction works, as appropriate, to inform consideration of Section 61 agreements.	Agreement with the EHO for relevant planning authorities on the terms of Section 61 consents	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Noise and vibration	NV007	ES 12.5.12 g i	Best Practicable Means	Best Practicable Means (BPM) as defined under Section 72 of the Control of Pollution Act 1974 would be employed during the construction phase to reduce noise nuisance. These would include measures such as: - installing and maintaining hoarding around the construction areas likely to generate noise - keeping site access routes in good condition with condition assessments on site to inspect for defects such as potholes - turning off plant machinery when not in use - maintaining all vehicles and mobile plant such that loose body fittings or exhausts do not rattle or vibrate - using silenced equipment where available, in particular silenced power generators and pumps - no music or radios would be played for entertainment purposes outdoors on-site - plan site layout to ensure that reversing is kept to a practicable minimum. Reversing manoeuvres, that are required would be managed by a trained banksman / vehicle marshal to ensure they are conducted safely and concluded quickly - non-percussive demolition techniques would be adopted where reasonably practicable to reduce noise and vibration impact	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Noise and vibration	NV008	ES 12.5.13 a i	Community Engagement	Residents would be notified of particularly noisy work such as percussive piling and concrete breaking prior to their commencement. The mechanisms for notification will be detailed in the Community Engagement Plan. Effective communication would be established, keeping local residents informed of the type and timing of works involved, paying particular attention to potential evening and night time works and activities which may occur in close proximity to receptors.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Noise and vibration	NV009	ES 12.5.13 b i	Noise Monitoring	During the construction phase, day and night time noise and vibration monitoring would be undertaken at locations identified in consultation with the relevant local planning authorities to ensure that the mitigation measures suggested are working effectively.	Compliance with the terms of Section 61 consents	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Noise and vibration	NV010	ES 12.5.13 c i	Haulage routes	A maintenance programme which includes inspection of all haul routes and infill of pot holes and other surface irregularities would be implemented to reduce noise and vibration.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Noise and vibration	NV011	ES 12.5.20	Acoustic barriers	Acoustic barriers, of the dimensions presented in Table 12.30, in Section 12.5 of the Environmental Statement (Application Document 6.2), would be installed prior to road opening at the locations shown on ES Figure 12.7 (Application Document 6.2). The performance of these barriers would be compliant with the specifications and requirements of DMRB LA 119 'Roadside environmental mitigation and enhancement – Appendix A'.	Installation of acoustic barriers	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Noise and vibration	NV012	ES 12.5.12 c ii	Conveyor systems	An acoustic insulation cover would be installed to reduce noise from conveyor systems that are operating within 300m of any noise sensitive receptors, as defined in section 12.3 of the ES (DCO Application Document 6.2).	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Noise and vibrat	NV013	ES 12.5.14	Road surfacing	A 'Level 3', very quiet road surfacing system, as defined by Highways England Specification for Highways Work Volume 1, Series 900, Table 9-17, shall be provided on all new and altered trunk roads and associated slip roads forming part of the Project.	Implementation of commitment actions	Contractor	Operation	EMP2 - Requirement 4	Mitigation	Good Practice
Noise and vibrat	NV014	ES 12.5.14	Operational fixed plant at tunnel service buildings	The noise emitted from operational fixed plant located at the tunnel service buildings shall not result in exceedance of the existing background level by more than 0 dB(A) at the nearest residential receptors when assessed in accordance with BS 4142: 2014.	Implementation of commitment actions	Contractor	Operation	EMP2 - Requirement 4	Mitigation	Good Practice
Population and Human Health	PH001	ES 13.5.26	Public Rights of Way	Construction works would be planned in order to reduce the durations of time which footpaths, cycleways and bridleways would need to be closed. For those PRoW identified in ES Tables 13.48 and 13.50 (Application Document 6.2), the following mitigation measures would be adopted: a) early engagement with members of the public and relevant stakeholders (for example, local walking groups), in order to ensure they are fully appraised of any closures and diversions as far in advance as practicable; b) Clear and concise signposting would be used in order to clearly outline any temporary diversions as and when they are necessary. This would be carried out in consultation with the local highways authority, PRoW officers and other relevant stakeholders; and c) Social media would be used in order to update members of the public in real time of any closures and diversions which are in place.	Compliance with Local Authority PRoW officer requirements	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE001	ES 14.5.7 (b)	Temporary drainage design	Work site drainage systems would incorporate pollution control systems designed in line with Control of Water Pollution from Construction Sites C532 (CIRIA 2001) or as agreed with Highways England. Watercourses near work sites would be regularly inspected for signs of siltation or other forms of pollution in line with CIRIA C741 guidance (CIRIA, 2015) and pumped groundwater, process effluents and construction site runoff would be tested to ensure compliance with discharge consent requirements.	Acceptance by Highways England of construction site drainage systems	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE002	ES 14.5.7 (c)	Temporary drainage design	Work site drainage systems would be inspected and maintained to ensure they continue to operate to their design standard, safeguarding surface and groundwater quality	No pollution of surface or groundwater from site drainage	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE003	ES 14.5.11 (a)	TBM water supply	The water to supply to the TBM may be supplied by groundwater abstracted from a Northumbrian Water borehole at Linford. If this is the case, then extraction rates would be agreed Northumbrian Water prior to commencement of main tunnelling works and would not be exceeded.	Compliance with agreed extraction rates	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE004	ES 14.5.7 (d)	Construction water management	Water use efficiency and leakage reduction measures would be adopted during the construction phase, such as use of water efficient fittings (taps, toilets) in site offices and welfare facilities, use of misting/atomising systems for dust suppression, drive on recirculating systems for wheel washing, and sub metering to help in detecting leaks where reasonably practicable.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE005	ES 14.5.7 (e)	Construction water management	Wastewater generated from the compound welfare facilities would be discharged to sewer, subject to the agreements with the utility providers, or in locations where a sewer connection is not reasonably practicable, collected and tankered off site for disposal at a licensed treatment facility.	Compliance with sewer discharge consents	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE006	ES 14.5.7 (f)	Construction water management	Surface water drainage would be provided for all surfaced roads and yards, buildings and any other hard or impermeable surfaces. Berms and bunds would be constructed to manage surface water runoff where necessary to protect watercourses, prevent ponding and to keep general runoff separate from contaminated runoff. Rainfall runoff from areas where there is a risk of contamination would be managed using temporary drainage systems and would be subject to treatment prior to discharge to any surface watercourse or drain. Rainfall runoff from areas of low contamination risk would be captured and re-used where reasonably practicable e.g. to supply wheel wash facilities or for dust suppression, to reduce consumptive water use.	Highways England approval of drainage system details	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE007	ES 14.5.7 (g)	Protection of flood defences from ground movement	The potential for an impact on the integrity of the River Thames flood defences due to ground movement during tunnelling would be reduced by adopting good tunnelling practice, such as; continuous working, erecting linings immediately after excavation, grouting, management of tunnel face pressures and the measurement of excavated material quantities. In line with the requirements of the Environment Agency, flood defences would be monitored to establish a pre-construction baseline and for a period of at least 2 years after completion of works to construct the tunnel to enable detection of any effects on the structural integrity/condition of the assets during construction of the Project. The monitoring methodology would be agreed with the Environment Agency and would continue until the annual rate of settlement is less than a rate identified agreed with the Environment Agency.	Avoidance of settlement that may affect the integrity of flood defences	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Road Drainage and Water Environment	RDWE008	ES 14.5.7 (h)	Protection of watercourses during utility works	Where below ground utilities diversions are required, watercourses would be crossed using trenchless techniques in order to avoid disturbance to channel form, flow regimes and riparian habitats and species, unless other techniques are agreed with the Environment Agency or LLFA, where relevant.	Implementation of commitment actions	Contractor	Construction	Protective Provisions – Schedule 14	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE009	ES 14.5.7 (i)	Reinstatement of bankside vegetation	Bankside vegetation would be re-instated at culvert entries and exits following the completion of construction works as soon as conditions are suitable for planting.	Successful reinstatement of vegetation at these locations within 12 months.	Contractor	Construction	Landscaping scheme - Requirement 5	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE010	ES 14.5.7 (j)	Bank protection	Where bank protection is required during construction work, this would take the form of soft or natural river bank protection, such as coir or other biodegradable geotextiles .	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE011	ES 14.5.8 (a)	Operational drainage design	To reduce the potential for scour and associated hydromorphological change, highway drainage outfall headwall arrangements would be set back from the banks of the receiving watercourses and outfall designs would accord with DMRB CD 529.	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Construction	Requirement 8	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE012	ES 14.5.8 (b)	Operational drainage maintenance	Drainage infrastructure and treatment systems would be maintained in accordance with the Highways England GS 801: Asset Delivery asset inspection requirements and GM 701: Asset delivery asset maintenance requirements (ADAMr) as applicable, to ensure they continue to operate to their design standard to safeguard surface and groundwater quality.	No pollution of surface or groundwater from site drainage	Highways England	Operation	EMP3 - Requirement 4	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE013	ES 14.5.8 (c)	Culvert design	Where culverting cannot be avoided, new culverts would be sized to maintain the current land drainage regime and to convey flood flows, inclusive of allowance for climate change as detailed in Appendix 14.6 of the ES (Application Document 6.3) without causing any detriment to baseline flood risk. Culvert inverts would be buried below existing bed levels to allow baseline bed levels, slopes and bed materials to be maintained.	SoS approval for details of drainage system following consultation with the relevant planning authority	Highways England	Operation	Requirement 8	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE014	ES 14.5.8 (d)	Culvert maintenance	Culverts would be inspected and maintained, in accordance with Highways England GS 801: Asset Delivery asset inspection requirements and GM 701: Asset delivery asset maintenance requirements (ADAMr) as applicable. Where there are any additional specific inspection or maintenance requirements these would be documented in the Maintenance and Repair Statement.	Unobstructed free flow of culverted waters	Highways England	Operation	EMP3 - Requirement 4	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE015	ES 14.5.11 (c)	Replacement of existing reservoir at Low Street	An existing well and reservoir at Low Street used by a landowner to pump and store groundwater to feed irrigations systems would be crossed by the Project. Prior to works for the construction of the viaduct crossing that may impact this well and reservoir, this water supply system would be reconfigured, as agreed with the landowner, to maintain continuity of supply during construction and operation of the Project.	Continued provision of irrigation water at this location.	Contractor	Operation	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE016	ES 14.5.11 (d)	Replacement of landowner water supply at North Ockendon	An existing surface water abstraction which is fed by groundwater flows emerging as a spring near North Ockendon (identified on page 3 of Figure 14.2 of the ES, Application Document 6.1) may be compromised by the construction of the cutting beneath the M25. Prior to construction of the cutting an alternative water supply would be provided. The new supply would be tested for continuity of supply and water quality for a minimum period of 6 months from installation or as agreed with the landowner. A supply route from the new source to the existing landowner irrigation system would also be provided.	Continued provision of irrigation water at this location.	Contractor	Operation	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE017	ES 14.5.11 (e)	Ground improvement tunnel	The Contractor would stabilise the ground to reduce ground movement (e.g. to protect Network Rail assets), facilitate operation of the TBM and maintenance of the cutterhead using a ground improvement tunnel or other suitable methods accepted by Highways England that would avoid the need for surface excavations/penetrations within areas designated for protection of wildlife.	Avoidance of surface excavation associated with TBM operation in areas on the southern shores of the River Thames designated for wildlife protection.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE018a	ES 14.5.11 (f)	Ground improvement tunnel	The ground improvement tunnel and shafts, if used under REAC ref. RDWE017, would be constructed using methods to control groundwater pumping and ingress such as: • Wet excavation and grout plug placement to form the shafts • Use of an earth pressure balancing TBM to form a lined tunnel with a specified maximum leakage rate compliant with the Lower Thames Crossing tunnelling specification	Prior acceptance of methods by Highways England and implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE018b	ES 14.5.11 (g)	Ground improvement tunnel	The ground improvement tunnel and shafts, if used under REAC ref. RDWE017, would be decommissioned by backfilling with suitable materials to ensure the ground improvement tunnel and shafts are completely filled. No temporary works would be left in the upper 2m of ground. Shaft sites would be returned to their current land use.	Prior acceptance of methods by Highways England and implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE019	ES 14.5.11 (h)	Ground treatment	Chemicals and materials, such as cement, grout and lubricants used during construction activities in proximity to any groundwater Source Protection Zone would be stored, transported and used in a suitable manner to safeguard potable water supply.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE020	ES 14.5.11 (i)	Ground treatment	Construction of cross passages between the main tunnels would use groundwater control techniques, such as grouting or ground freezing, to reduce the requirement for dewatering and therefore local groundwater drawdown.	Working methods to be approved by Highways England prior to construction	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential

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Road Drainage and Water Environment	RDWE021	ES 14.5.11 (j)	Bankside reinstatement	Bankside vegetation re-instatement and planting at the entrances to West Tilbury Main culvert would be designed to ensure no sharp light/dark interface to encourage continued fish passage. This would be achieved by planting with a scrub mix that will include Alder. Root barriers would be installed to protect structural integrity of the bank as appropriate.	Successful establishment of suitable scrub mix within 24 months to provide diffuse shading	Contractor	Construction	Landscaping scheme - Requirement 5	Mitigation	Essential
Road Drainage and Water Environment	RDWE022	ES 14.5.11 (m)	Compounds CA03A, CA03B CA05, CA05A, CA11 Construction flood risk	In accordance with the requirements of the National Planning Policy Framework regarding development and flood risk, construction compounds CA05, CA05A and C11 to the north of the River Thames and CA03A and CA03B to the south of the River Thames which are partially sited within Flood Zones 2 and 3, would be laid out in accordance with a site-specific flood risk assessment following the Sequential Test, where facilities at highest vulnerability to flooding, e.g. sleeping accommodation, medical and welfare and principal office facilities, are located in the lowest flood risk zone (Zone 1). Only low vulnerability and water compatible uses would be situated in the high-risk Flood Zone 3.	Acceptance by Highways England of the layout of buildings and facilities within construction compounds.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE023	ES 14.5.11 (n)	River Thames discharge	To mitigate potential effects on water quality and hydrodynamics within the River Thames, the discharge arrangement described in REAC ref. RDWE028 would be constructed and operational in advance of the excavation of the north portal and tunnelling works and would be used as the temporary discharge for treated construction phase effluents. All effluents would receive treatment prior to discharge into the Thames to ensure compliance with any limits detailed in the conditions of discharge as agreed with the Environment Agency.	Compliance with the Deemed Marine Licence and EA Discharge Consent	Contractor	Construction	Deemed Marine Licence - Schedule 15	Mitigation	Essential
Road Drainage and Water Environment	RDWE024	ES 14.5.11 (o)	Maintenance and decommissioning of marine structures	Potential effects arising from the maintenance, use and decommissioning of marine structures would be controlled by the measures agreed with the MMO as detailed in the Deemed Marine Licence.	Compliance with the Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15	Mitigation	Essential
Road Drainage and Water Environment	RDWE025	ES 14.5.6 (c)	Operational drainage design	Drainage design would include a treatment train for highway runoff designed in accordance with DMRB CG 501 and CD 532 to meet the requirements specified for each outfall to surface watercourses identified in Appendix 14.3 of the ES (Application Document 6.3).	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8	Mitigation	Essential
Road Drainage and Water Environment	RDWE026	ES 14.5.12 (a)	Tunnel operational drainage design	The drainage system would include provision for the capture and isolation of contaminated waters to prevent pollution of the receiving watercourse. Discharges would be restricted to high tide conditions in order to maximise available dilution and mixing and to prevent scour/erosion of the intertidal zone.	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8	Mitigation	Essential
Road Drainage and Water Environment	RDWE027	ES 14.5.14 (a)	Tunnel lining specification	Water infiltration into the tunnel bores and cross passages during operation would be reduced by measures including gaskets (for segmentally lined tunnels) and membranes (for sprayed concrete lined tunnels), compliant with the Lower Thames Crossing tunnelling specification.	Acceptance of detail design by Highways England	Highways England	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE028	ES 14.5.14 (b)	North Portal construction compound drainage discharge	Drainage from the North Portal construction compound is proposed to outfall from the north side of the River Thames. The design of the discharge pipeline and outfall to the River Thames would provide for a subtidal mid-water discharge for effective dilution and dispersal, and to reduce disturbance to the intertidal zone. The discharge infrastructure would be designed in accordance with measures agreed with the Marine Management Organisation (MMO) as detailed in the Deemed Marine Licence (DCO Schedule 15).	Compliance with Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15	Mitigation	Essential
Road Drainage and Water Environment	RDWE029	ES 14.5.14 (c)	Flood alleviation	Incorporation of a suite of flood alleviation measures such as altering road geometry to set the vertical alignment of carriageways above the design flood level, inclusive of freeboard and allowance for climate change resilience, including provision for flood bunds or walls to protect areas where the vertical alignment of the road is lower than the design flood level, to make the development safe from flooding over its design lifetime in line with the requirements of DMRB LA 113.	Approval of the flood risk design measures by the Secretary of State in consultation by the Environment Agency	Contractor	Operation	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE030	ES 14.5.11 (p)	Culverting of Tilbury Main and maintaining fish passage	The West Tilbury Main culvert would integrate a fish pass aid designed for eels and elvers, incorporating some form of matrix, such as bristles, to assist their migration by crawling/climbing instead of swimming.	Highways England acceptance of the detailed design after consultation with the Environment Agency	Contractor	Operation	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE031	ES 14.5.11 (q)	Culverting of Tilbury Main and maintaining fish passage	The West Tilbury Main culvert would be partially submerged at its downstream end to prevent perching and a resting pool for coarse fish would be provided immediately downstream of the culvert, with a minimum depth of 30cm.	Highways England acceptance of the detailed design after consultation with the Environment Agency	Contractor	Operation	EMP2 - Requirement 4	Mitigation	Essential

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Road Drainage and Water Environment	RDWE032	ES 14.5.13	Potable groundwater protection	The proposed road drainage attenuation and treatment pond located at Chadwell St Mary, as indicated on the Environmental Masterplan, is situated within a groundwater Source Protection Zone 1. The pond would include an impermeable lining in order to prevent seepage of drainage discharges into the ground to safeguard potable groundwater quality.	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8	Mitigation	Essential
Road Drainage and Water Environment	RDWE033	ES 14.5.11 (k)	Discharge from construction of South Portal	Water discharged into the Thames Estuary and Marshes Ramsar from the South Portal construction compound would be treated to the standard specified within the discharge licence consent granted by the Environment Agency and released at greenfield runoff rates. The runoff collection and management system would be operated until full reinstatement of the compound area is complete.	Compliance with EA discharge licence	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE034	ES 14.5.12 (b)	Operational drainage	To safeguard groundwater Water Framework Directive chemical status, infiltration basins would be provided at the locations identified on the Environmental Masterplan, fitted with treatment systems as identified on the schedule within the hydrogeological risk assessment report at Appendix 14.5 of the ES (Application Document 6.3). Proposed new infiltration basins serving smaller road drainage catchments at the A13 junction and south of the River Thames would have vortex grit separators. Those serving larger drainage catchments south of the River Thames would include lined sedimentation basins, vortex grit separators and penstock chambers. The two cascading infiltration basin systems, both located to the south of the River Thames as illustrated on the Environmental Masterplan, would incorporate sedimentation basins, areas of vegetated wetlands and penstock chambers. Where existing infiltration basins along the A2/M2 and at the M25 are to be retained and used by the Project, existing oil interceptors would be replaced with vortex grit separators and a penstock chamber to allow isolation and clean-up of accidental spillages.	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8	Mitigation	Essential
Road Drainage and Water Environment	RDWE035	ES 14.5.14	Operational drainage	Where the Project ties in with the existing A2/M2 and M25 highways, the existing drainage infrastructure would be enlarged to accommodate the discharge from catchments affected by the Project in accordance with current design guidance, with appropriate allowances for climate change as detailed in DMRB CG 501: Design of Highway Drainage Systems and in line with Lead Local Flood Authority requirements. Specifically, the enlargement of existing M25 drainage infrastructure affected by the Project, as illustrated on the Environmental Masterplan, would achieve a reduction in existing runoff rates of approximately 50% by providing additional storage capacity. New drainage infrastructure, illustrated on the Environmental Masterplan, would serve the remainder of the Project and would provide storage to achieve discharges to surface watercourses at greenfield rates.	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8	Mitigation	Essential
	RDWE036			NOT USED						
Road Drainage and Water Environment	RDWE037	ES 14.5.11 (l)	Mitigating effects of construction in the floodplain	Compensatory flood storage would be provided to offset the volume of floodplain storage displaced by the Project, as described in Appendix 14.6 of the ES (Application Document 6.3). The compensatory storage would be formed and expanded in stages during construction of the Project. The compensatory storage may be used to offset any temporary loss of floodplain storage provided that the volume of compensatory flood storage available always equals, or exceeds, the total volume of displaced floodplain storage.	Compliance with EA Flood Risk Activity Permit	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE038	ES 14.5.11 (r)	Avoiding impacts on Cranham Marsh Local Nature Reserve	Habitat survey data have identified discrete pockets of vegetation which is typically groundwater dependent at Cranham Marsh Local Nature Reserve (LNR). During detailed design, having regard for ground investigation (GI) data, measures to reduce groundwater drawdown beyond the M25 cutting, comprising either the extension of retaining walls or other seepage control systems, would be confirmed. If confirmed to be necessary, the detail of such measures will be agreed in consultation with London Borough of Havering and the Environment Agency and implemented as needed to protect groundwater dependent habitat at the LNR.	No detriment to groundwater supply at Cranham Marsh LNR	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
	RDWE039			NOT USED						

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Road Drainage and Water Environment	RDWE040	ES 14.5.14 (d)	Maintaining floodplain flow conveyance	Flood relief culverts as described in Appendix 14.6 of the ES would be provided to maintain floodplain connectivity and prevent embankments forming continuous barriers to floodplain flow conveyance to the south of Station Road in East Tilbury and west of the proposed viaduct spanning the Mardyke and Golden Bridge Sewer. At the latter location, localised minor land raising would be undertaken to prevent off-site increases in flood risk. The extent of land raising required is illustrated in Plate 4-7 of the Flood Risk Assessment presented in ES Appendix 14.6 (Application Document 6.3).	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8	Mitigation	Essential
Road Drainage and Water Environment	RDWE041	ES 14.5.11 (s)	Avoiding scour protection works in River Thames	The main tunnels would be constructed so that the crown of the tunnel is at sufficient depth below the bed of the River Thames to avoid the need for any works within the river to provide tunnel scour protection.	No works within the River Thames channel to provide tunnel scour protection	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE042	ES 14.5.11 (t)	Compensating for inter-tidal habitat loss	The Project would cause a loss of temporary approximately 0.4 ha of inter-tidal habitat if the East Tilbury jetty is used. Under this circumstance, to compensate for this loss, which would be reversed following decommissioning of the jetty, the Project would contribute financially to a third-party estuary wide enhancement / restoration programme, such as those delivered by the EA, Thames21 and the Thames Estuary Partnership . The funding level would be agreed with the third-party delivery organisation as appropriate, based on the management and delivery of a net-gain equivalent of the marine habitat loss incurred because of the Project's design.	Delivery of inter-tidal habitat to offset loss due to use of the jetty.	Highways England	Construction	EMP2 - Requirement 4	Mitigation	Essential
Road Drainage and Water Environment	RDWE043	ES 14.5.7 (o)	Managing construction drainage	In order not to compromise their function, existing drainage attenuation features (ponds and infiltration basins) on the A2/M2 and M25 highways affected by the Project, as illustrated on the Environmental Masterplan, would not be used to receive construction work site runoff over and above runoff from the existing drained area.	Use of construction site drainage systems, which do not use the existing drainage attenuation features on the A2/M2 and M25 highways.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Road Drainage and Water Environment	RDWE044	ES 14.5.6 (h)	Mammal passages in culverts	To ensure continued mammal passage, mammal ledges and underpasses at locations identified in the Environmental Masterplan would be designed to be set above flood levels at a 1 in 100 year (1% annual probability) flood event, while maintaining 600mm headroom from the top of the mammal ledge to the soffit of the culvert. Following Essex County Council's (2012) Culvert Policy and the Environment Agency Fluvial Design Guide – Chapter 8.6 'Culverting of watercourses' (2019), ledges would be at least 500mm wide and accessible from bank ramps.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB001	ES 8.5.29	Hedgerow replacement	Hedgerow habitat lost during construction would be compensated by creating new hedgerows at locations shown on the Environmental Masterplan, using native species of local provenance. Planting would be undertaken as early in the construction programme as reasonably practicable, having regard for the completion of potentially damaging construction activities within and adjacent to the planting area, and seasonal requirements for planting.	Successful establishment of new hedgerow.	Contractor	Construction	Landscaping scheme - Requirement 5	Mitigation	Good Practice
Terrestrial Biodiversity	TB002	ES 8.5.21	Maintaining integrity of important habitats adjacent to works	Temporary fencing would be used to demarcate important and protected habitats, preventing construction access to protect them from accidental damage. Important and protected habitats include ecological translocation sites, and retained woodland, trees and hedgerows shown on the Environmental Masterplan. Fencing would be installed under the supervision of the Environmental Clerk of Works and in accordance with good practice guidance such as BS 5837:2012 Trees in relation to design, demolition and construction.	Successful retention of important habitats.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Terrestrial Biodiversity	TB003	ES 8.5.22	Maintaining integrity of important habitats adjacent to works	Work compounds, access tracks, haulage routes, material storage areas, generators and other construction activities would not be located within areas of retained vegetation shown on the Environmental Masterplan.	Implementation of commitment actions.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Terrestrial Biodiversity	TB004	ES 8.5.24	Breeding birds	Disturbance, and incidental mortality, of breeding birds would be avoided by timing vegetation clearance and structure removal outside of the bird nesting season (March to August inclusive) wherever possible. Where this is not possible, appropriate measures would be taken to avoid harming birds or their nests (such as temporary fencing around nesting sites where they are immediately adjacent to construction works), under supervision by a suitably experienced Environmental Clerk of Works.	Compliance with the Wildlife and Countryside Act 1981 (as amended).	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Terrestrial Biodiversity	TB005	ES 8.5.25	Invasive species	Invasive species would be identified prior to construction and would be removed or treated to prevent their spread, following the Construction Industry Research and Information Association's (CIRIA) guidance in Wade et al. (Invasive Species Management for Infrastructure Managers and the Construction Industry, 2008)	Implementation of commitment actions.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Terrestrial Biodiversity	TB006	ES 8.6	Environmental Clerk of Works	Employment of suitably qualified and experienced Environmental Clerks of Works (ECoW) throughout the construction phase of the project to supervise implementation of environmental mitigation and protection commitments.	Acceptance by Highways England of the ECoW nominated by the Contractor.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Good Practice
Terrestrial Biodiversity	TB007	ES 8.5.27	Habitat management	Retained and new habitats would be managed having regard for Natural England's The Mosaic Approach: Managing Habitats for Species (2013) to improve both priority habitats and species.	Implementation of procedures for long term management of habitat created under the landscaping scheme	Highways England	Operation	EMP3 - Requirement 4	Mitigation	Good Practice
Terrestrial Biodiversity	TB008	ES 8.5.40	Badger setts	Badger setts identified within the Order Limits for closure would be closed by permanently excluding badgers and then removing the empty setts. The setts would be closed under licence from Natural England outside of the badger breeding season (breeding season takes place between 1st December and 30th June). For any main setts that will be closed with no suitable naturally occurring alternative sett, an artificial sett will be constructed in a suitable location.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB009	ES 8.5.42	Bat roosts	Bat roosts that would be lost or heavily disturbed due to construction or operational activities would be removed under licence and alternative roosting structures would be provided in areas indicated on the Environmental Masterplan.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB010	ES 8.5.44	Barn owl breeding sites (direct loss)	Barn owl breeding sites that would be lost due to construction would be removed while not in active use. Alternative breeding sites (nest boxes) would be provided >1.5km away from the Project boundary and other major roads, within an appropriate setting and in compliance with Barn Owl Trust advice (2015). As agreed with the Essex Wildlife Trust (EWT), a minimum of 12 artificial nest boxes would be installed in land managed by them. This would provide a replacement ratio two boxes for one lost site; the final number of boxes required would be informed by pre-construction surveys.	Provision of Barn owl breeding sites	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB011	ES 8.5.45	Barn owl breeding sites (disturbance)	Barn owl breeding sites which would not require closure, but that may be subject to disturbance due to proximity to works, as identified in ES Figure 8.18 (Application Document 6.2), would be screened by acoustic fencing to prevent disturbance during the breeding season under the supervision of the Environmental Clerk of Works.	Implementation of commitment actions in accordance with Natural England guidance.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB012	ES 8.5.46	Breeding birds (temporary loss of nesting habitat)	Bird nest boxes would be provided within areas of retained woodland and trees shown on the Environmental Masterplan to supplement the habitat creation by offsetting the loss of nesting opportunities whilst newly created habitats establish. A ratio of 10 assorted small nest boxes and 1 medium open fronted nest box per hectare of lost woodland/scrub would be adopted in accordance with BTO Field Guide No. 23, where it is reasonably practicable to erect this number of nest boxes. For hedgerows, a ratio of 10 assorted small nest boxes per kilometre of hedgerow would be adopted, where it is reasonably practicable to erect these numbers within retained vegetation. The measures would be implemented under the supervision of the Environmental Clerk of Works.	Implementation of commitment actions in accordance with BTO guidance.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB013	ES 8.5.26	Displacement of protected/notable species	Where habitats that are known or assumed to support protected or notable species, as identified on ES Figures 8.01-8.31 or referred to in ES Sections 8.01 - 8.14, clearance would take place in a phased, directional manner towards areas of contiguous retained habitat. This would encourage mobile species to actively move from the construction site into the wider landscape. These measures would be implemented under the supervision of the Environmental Clerk of Works.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB014	ES 8.5.48	Natural England licences	All required Natural England licences and associated working practices and method statements would be in place prior to any related construction works starting in areas where licensable species occur.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB015	ES 8.5.51	Monitoring of pre-existing protected species and important habitats	Monitoring of protected species during and post-construction would be in line with the requirements of the protected species mitigation licence.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4	Monitoring	Essential

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Terrestrial Biodiversity	TB016	ES 8.5.47	Translocation of protected species	Where the approach to habitat clearance referred to in REAC ref. TB013 is not considered appropriate to avoid potential mortality of protected species, a programme of trapping and translocation would occur to move animals away from the construction site and to established receptor sites with sufficient carrying capacity prior to habitat clearance occurring. Species or groups which may be subject to trapping and translocation are GCN (and all other native amphibian species found during this process), water voles and dormice.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB017	ES 8.5.49	Translocation of notable species	Where protected species licences are not required, the approach to habitat clearance and the potential need to trap and translocate non-licensable species (reptiles and/or native amphibians species excluding GCN) to established receptor sites with sufficient carrying capacity would be determined and undertaken by the Environmental Clerk of Works.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB018	ES 8.5.50	Translocation of habitat features of value to protected/notable species	Habitat features of value to protected species that can themselves be moved to mitigation areas/receptor sites (for example dead-wood features for terrestrial invertebrates, and refugia for amphibians and reptiles) would be translocated where appropriate, to be determined by the Environmental Clerk of Works.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB019	ES 8.5.53	Translocation of acid grassland	An area (approx. 1 hectare) of priority Biodiversity Action Plan acid grassland in Low Street Pit, as indicated on ES figure 8.1. (Application Document 6.2), would be translocated to a receptor site. The receptor site is an area of grassland located between the sea wall and the Parish Church of St. Catherine (centred on Grid Reference TQ 69011 77146), approximately 100m to the north of Coalhouse Fort. This would be achieved by removing turf from the acid grassland and replanting it on the receptor site shown on the Environmental Masterplan.	Successful re-establishment of acid grassland at the donor site within 24 months of planting	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB020	ES 8.5.52	Translocation of important lichens	Where important lichen species, Usnea cf. esparantiana, present within woodland south west of the M25 junction 29, and Phyysconia distorta and Fellhaneropsis vezdae, present within The Wilderness woodland, are found on trees being felled or pruned to accommodate works, any timber hosting these species would be retained and moved immediately after felling into retained areas of the same woodland as shown in the Environmental Masterplan. Timber would be placed on the woodland floor immediately adjacent to a tree of the same host species. All works would be supervised by the Environmental Clerk of Works.	Presence of translocated lichen 24 months after translocation	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential
Terrestrial Biodiversity	TB021	ES 8.5.39	Watercourse diversion planting	During construction works, it would be necessary to permanently divert a number of watercourses, particularly around the Mardyke and the North Portal area as identified on the Environmental Masterplan. Where this occurs, the new watercourses would be planted to ensure they have a greater floral diversity to benefit a wider range of species than the existing watercourses.	Successful reinstatement of vegetation at these locations within 12 months.	Contractor	Construction	Landscaping scheme - Requirement 5	Mitigation	Essential
	TB022			NOT USED						
	TB023			NOT USED						
	TB024			NOT USED						
	TB025			NOT USED						
	TB026			NOT USED						
Terrestrial Biodiversity	TB027	ES 8.5.42	Construction of replacement air raid bunker	An air raid bunker within Shorne Woods containing a hibernation bat roost would be lost as a result of the Project. A replica bunker would be constructed, prior to demolition of the existing structure, within land between Shorne Wood and Great Crabbles Wood at a location to be agreed with Natural England. The bunker would be constructed from brick with block work covering, designed to provide similar internal temperatures and humidity levels to the existing air raid bunker. Internally there would be additional brick work timber boarding approximately 150 x 75mm in size, on angles within the bunker allowing access behind them for bats. There would be 20 bat bricks installed in the internal walls.	Construction of bunker to meet design specifications and to provide similar internal temperature/humidity levels to existing air raid bunker.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential

Topic	REAC Ref No.	Source	Issue	Commitment	Achievement Criteria	Party Responsible	Stage	Securing Mechanism in DCO	Type of Commitment	Type of Mitigation
Terrestrial Biodiversity	TB028	ES 8.5.31	Ancient Woodland Soil Translocation	Areas identified on the Environmental Masterplan for compensatory ancient woodland planting to offset the loss of ancient woodland would be inoculated, where reasonably practicable, with soils from ancient woodland sites within Order Limits (as identified on ES Figure 8.01, DCO Application Document 6.2) that would be disturbed by construction activity. The suitability of the soil from the donor sites would be determined by a soil scientist prior to commencement of works in those areas, with consideration for existing ground flora composition and diversity and potential contamination. The soils would be translocated in advance of construction activities commencing at the donor sites, avoiding weather constraints e.g. heavy rainfall; timing conflicts with protected species licensing activities (e.g. capture and translocation of dormice); and only once any essential mitigation required for buried archaeology identified within the receptor sites has been completed. Soils would typically be stripped to ca. 300mm, disturbing the soil structure as little as reasonably practicable and carefully placed within the pre-prepared adjacent receptor sites, following guidance from CIRIA within Habitat Translocation - A Best Practice Guide (C600).	Evidence of establishment of typical ancient woodland ground flora indicator species within 60 months of soil translocation and tree planting in compensatory area.	Contractor	Construction	EMP2 - Requirement 4	Mitigation	Essential

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