national highways

Lower Thames Crossing

5.4.1.1 Final Agreed Statement of Common Ground between (1) National Highways and (2) the Environment Agency (Clean version)

APFP Regulation 5(2)(q)

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

Volume 5

DATE: December 2023
DEADLINE: 9A

Planning Inspectorate Scheme Ref: TR010032
Application Document Ref: TR010032/APP/5.4.1.1

VERSION: 5.0

Revision history

Version	Date	Submitted at
1.0	31 October 2022	DCO Application
2.0	18 July 2023	Deadline 1
3.0	3 October 2023	Deadline 5
4.0	17 November 2023	Deadline 7
5.0	15 December 2023	Deadline 9A

Status of the Statement of Common Ground

This is the Final Agreed Draft Statement of Common Ground between (1) National Highways (the Applicant) and (2) the Environment Agency.

Both parties have reached agreement on the position of the status of all 82 matters. Of the 82 matters contained within, 77 matters are agreed and five are not agreed, leaving no matters outstanding.

On behalf of the Applicant

Name	[redacted]
Position	
Organisation	National Highways
Signature	[redacted]

On behalf of the Environment Agency

Name	[redacted]
Position	
Organisation	Environment Agency
Signature	[redacted]

Lower Thames Crossing

5.4.1.1 Final Agreed Statement of Common Ground between (1) National Highways and (2) the Environment Agency (Clean version)

List of contents

Page number

List of tables

Page number

1 Introduction

1.1 Purpose of the Statement of Common Ground

1.1.1 This Statement of Common Ground (SoCG) has been prepared in respect of the Development Consent Order (DCO) application for the proposed A122 Lower Thames Crossing (the Project) made by National Highways Limited (the Applicant) to the Secretary of State for Transport (Secretary of State) under section 37 of the Planning Act 2008 on 31 October 2022.

1.1.2 The SoCG has been produced to confirm to the Examining Authority where agreement has been reached between the Applicant and the Environment Agency, and where agreement has not been reached.

1.1.3 This final version of the SoCG has been submitted at Examination Deadline 9A.

1.2 Principal Areas of Disagreement

1.2.1 On the 19 December 2022 the Examining Authority made some early procedural decisions to assist the Applicant, potential Interested Parties and themselves to prepare for the Examination of the DCO application.

1.2.2 One of these procedural decisions was to use a tracker recording Principal Areas of Disagreement in Summary (PADS).

1.2.3 The PADS Tracker would provide a record of those principal matters of disagreement emerging from the SoCG and should be updated alongside the SoCG as appropriate throughout the Examination with the expectation that a revised PADS Tracker should be submitted at every Examination deadline.

1.2.4 The Environment Agency elected not to produce a PADS Tracker at pre-examination stage, indicating to the Applicant that they were content that the number of outstanding matters within the SoCG was insufficient to warrant the exercise.

1.3 Terminology

1.3.1 In the 'Final position on matters' table in Section 2 of this SoCG, “Matter Not Agreed” indicates agreement on the matter could not be reached following significant engagement. “Matter Agreed” indicates where the issue has now been resolved.

2 Matters

2.1 Final position on matters

2.1.1 A summary of engagement undertaken between the Applicant and the Environment Agency is summarised in Appendix A.

2.1.2 The outcome of this engagement is presented in Table 2.1 which details and presents the matters that are either agreed or not agreed between (1) the Applicant and (2) Environment Agency.

2.1.3 It is acknowledged there are some matters where further discussion may take place during the detailed design stage of the Project to finalise detail, but the matter is agreed in principle. Matters to which this applies have an asterisk (*) next to them.

2.1.4 In the column ‘Item No’ in Table 2.1, ‘RRN’ indicates a matter entered into the SoCG as a result of content in the Relevant Representation, ‘RRE’ indicates an existing SoCG matter that was also raised in the Relevant Representation, ‘WR’ indicates a matter entered into the SoCG as a result of content in the ‘Written Representation’ and 'DLX' indicates a new matter added during examination at/around that deadline.

2.1.5 Since version 4 of this SoCG was submitted at Deadline 7, the following matters have moved from 'Matter Under Discussion' to 'Matter Agreed':

a. Item 2.1.79 ‘DCO and Consents’, ‘Environmental Permits’

b. Item 2.1.5 ‘DCO and Consents’, ‘Protective Provisions’

c. Item 2.1.7 ‘DCO and Consents’, ‘Article 68’

2.1.6 At Examination Deadline 9A there are 82 matters in total of which 77 are agreed, and five are not agreed.

2.1.7 This is the final Statement of Common Ground between the Applicant and the Environment Agency.

Table 2.1 Final position on matters

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
DCO and consents					
Environmental Permits	2.1.1 RRE	The applicant will need to identify where permissions such as environmental permits and abstraction licences are required.	Environmental permits and abstraction licences will be applied for as required by the Contractor(s). The need for environmental permits and abstraction licences is noted in the Consents and Agreements Position Statement. The Applicant has developed an outline environmental permitting strategy in collaboration with the Environment Agency as detailed in item 2.1.79.	Consents and Agreements Position Statement [**Document Reference 3.3 (8)**]	Matter Agreed
Environmental Permits	2.1.2 RRE	Discharges from construction compounds are required to be permitted by the Environment Agency.	Pre-application advice has been sought from the Environment Agency on discharges at the North and South Portals. It is agreed that environmental permits for discharges would be in accordance with REAC Commitment RDWE033 'Discharge from construction of South Portal' and REAC Commitment GS022 'North Portal' (Code of Construction Practice (ES Appendix 2.2)).	ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Agreed

Environmental Permits	2.1.79 (DL5)	The Environment Agency reviewed the outline Environmental Permitting Strategy (oEPS) issued by the Applicant on 11 September 2023, and provided initial comments on 29 September 2023. The Applicant issued version two of the oEPS on 30 October 2023, and a final version was shared on 28 November, which the Environment Agency The Environment Agency can accept the principle of the Outline Environmental Permitting Strategy. This is on the basis that it is a framework for permitting and is a live document which will change in future in light of further pre-application permitting discussions, which will be ongoing. It should be noted that all permit and consenting solutions are subject to detailed design, and that the Strategy may change as further information becomes available. The need for environmental permits and abstraction licences is also noted in the Consents and Agreements Position Statement. [REP6-014] and Code of Construction Practice [REP6-038]. We have agreed Stakeholder Actions and Commitment Register (SAC-R) commitment SACR-026. This states that National Highways will progress a Service Level Agreement (SLA) with the Environment Agency for the provision of advice and engagement in connection with permitting pre-application	The Applicant has developed an oEPS in collaboration with the Environment Agency. The first draft of the oEPS was shared with the Environment Agency on 11 September 2023, and a subsequent version which responds to the Environment Agency's comments was issued on 30 October 2023. A final version was shared on 28 November (Annex C.16). The Applicant welcomes the Environment Agency's acceptance of the principle of the oEPS (Annex C.17). The Applicant intends the oEPS to form the basis of detailed permitting and pre-application discussions throughout the detailed design and construction phase of the Project, and can be updated iteratively as required. The Applicant has also included SAC-R commitment SACR-026 to progress an SLA with the Environment Agency for the provision of advice and engagement in connection with permitting pre-application discussions for the Project in the period prior to and during construction.	Consents and Agreements Position Statement [**Document Reference 3.3 (8)**] Stakeholder Actions and Commitments Register [**Document Reference 7.21 (7)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
		discussions for the Lower Thames Crossing project in the period prior to and during construction.			
Flood Risk Activity Permits (FRAP)	2.1.3 RRE	The Environment Agency initially advised that a FRAP is likely to be required if works are proposed within 8m of the bank of a main river, or 16m of a tidal main river. It would also be required within 8m of any flood defence structure or culvert on a main river, or 16m on a tidal main river. The Environment Agency has subsequently agreed with the Applicant's' request that the Environment Agency agrees to disapply the requirement for FRAPs. Such agreement is conditional on the inclusion of Protective Provisions acceptable to the Environment Agency within the DCO. A form of Protective Provisions has been agreed.	The Applicant considers that flood risk activities could be addressed via protective provisions for the Environment Agency in the draft DCO. A form of protective provisions has been agreed with the Environment Agency.	Draft Development Consent Order [**Document Reference 3.1 (11)**]	Matter Agreed
Co-ordinating parallel consents and other Appropriate Assessment	2.1.4	The Environment Agency considers that the consultation on the mitigation requirements and the permitting of them has been constructive. The Environment Agency recommends that permits are applied for in appropriate time to facilitate the effective implementation of the mitigation, subject to the Environment Agency's pre-application advice	In accordance with the 2022 update of Planning Inspectorate's Advice Note Ten: Habitats Regulations Assessment relevant to Nationally Significant Infrastructure Projects), Sections 5.3 to 5.6, the Applicant has consulted with the Environment Agency and Natural England with regard to the need for two Environment Agency permits in relation to mitigation measures	HRA [**APP-487** and **APP-488**]	Matter Agreed*

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
		regarding further assessment being undertaken at detailed design stage. The Environment Agency would undertake their own HRA as a competent authority on permits which it issues.	proposed within the Habitats Regulations Assessment (HRA), namely the discharge permit for the construction discharge from the southern tunnel entrance compound; and the provision of a water control structure in the sea defences at Coalhouse Point to facilitate wetland creation.		

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Protective Provisions	2.1.5	The Environment Agency shared their standard Protective Provisions for flood risk activities with the Applicant in 2019. The Applicant shared their draft amendments in December 2020. The Environment Agency has subsequently updated their standard flood risk Protective Provisions. These were shared with the Applicant on 4 July 2022. The Applicant provided comments on the protective provisions, which the Environment Agency has now responded to. The form of protective provisions is agreed excepting paragraph 116(5) which relates to permitting issues. The Applicant has now removed paragraph 116 (5) and a new article 'Interface with waste operation permits' was included in the draft DCO at Deadline 4. Following extensive engagement with the Applicant, and as detailed in item 2.1.7, article 68 is now agreed. Please refer to our full submission on article 68 submitted at Deadline 8 [REP8-125].	The Applicant shared their draft amendments to the Environment Agency's standard flood risk Protective Provisions in December 2020. The Environment Agency did not provide comments on this drafting but has subsequently updated their standard Protective Provisions, which relate to flood risk activities, and shared these with the Applicant on 4 July 2022. A form of protective provisions has been agreed with the Environment Agency as detailed in item 2.1.3. A new article (68) within the draft DCO 'Interface with waste operation permits' was included in the draft DCO at Deadline 4. This was discussed with the Environment Agency on 5 September 2023 and was shared with the Environment Agency via e-mail on 12 September 2023. A further discussion was held on 17 October 2023. Following extensive engagement with the Environment Agency, and as detailed in item 2.1.7, article 68 is now agreed.	Draft Development Consent Order [**Document Reference 3.1 (11)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Protective Provisions	2.1.6	The Environment Agency has considered the Applicant's proposal to disapply the Environmental Permitting (England and Wales) Regulations 2016 (as amended) (EPR 2016) with respect to waste operations, through a series of technical and legal discussions, and formal papers, and has also considered the drafting for a new set of Protective Provisions proposed by the Applicant in relation to this disapplication. The Environment Agency does not agree that the disapplication of the EPR 2016 with respect to waste operations is appropriate or necessary and are not willing to give consent under section 150 of the Planning Act 2008 to the disapplication of the relevant provisions.	The Project approach to Environmental Permitting with respect to waste operations has been under discussion with the Environment Agency since 2019. The Applicant had proposed to seek disapplication of the EPR 2016 relevant to waste operations, due to the complexity of the interactions between existing permitted operations at the North Portal construction area with any permits that might be required by the Project for waste operations during construction. Following extensive and considered engagement between the technical and legal teams, the Environment Agency concluded that they did not support this approach. The Applicant has considered the Environment Agency's detailed feedback and has agreed not to seek to disapply the need for an environmental permit for waste operations under the EPR 2016. Accordingly, the Applicant no longer seeks the Environment Agency's consent under section 150 of the Planning Act 2008 in respect of such a waste permit.	Draft Development Consent Order [**Document Reference 3.1 (11)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Article 68	2.1.7 RRE	On 12 September the Environment Agency was provided with the drafting of a proposed Article within the draft DCO with respect to environmental permits issued under the EPR 2016 that are held by third parties and may interact with land that is inside the Project's Order Limits and therefore the Project's construction operations. Following extensive engagement between the Environment Agency and the Applicant, article 68 of the draft DCO is now agreed. Please refer to our full submission on Article 68 submitted at Deadline 8 [REP8-125].	The Applicant had provided drafting of protective provisions to the Environment Agency for review, with respect to the EPR 2016 (paragraph 116(5)). The Environment Agency did not agree to this drafting and therefore the Applicant has now agreed to remove paragraph 116(5), and has instead included a new article (68) within the draft DCO 'Interface with waste operation permits'. This is in relation to existing environmental permits held by third parties, where the Applicant has no control over the permit or third party operations, but the permit relates to land that is within the Project's Order Limits. Following extensive collaboration, the drafting of article 68 has been agreed with the Environment Agency. Article 68 requires the Applicant (or the undertaker) to agree an environmental scheme with the Environment Agency where inconsistencies or conflicts with an existing permit are likely. The environmental scheme must be produced with regards to the representations made by the third-party permit holder and the	Draft Development Consent Order [**Document Reference 3.1 (11)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
			Environment Agency. Following approval of the written scheme, the Environment Agency will issue a regulator initiated variation to the existing permit to allow the undertaker to complete the authorised works. The drafting also allows the undertaker to submit permit surrender applications on behalf of the third-party permit holder. The Applicant and the Environment Agency confirmed that article 68 had been agreed in Issue Specific Hearing 14 on 28 November 2023.		

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Tunnel Protection Zones.	2.1.8 RRE	The Environment Agency has asked for clarifications regarding works within tunnel protection zones.	The tunnel protection zones are related to works restrictions for protection of the tunnel. In the first protection zone no activities are allowed, and in the second protection zone dredging and maintenance is allowed (works undertaken by the Port of London Authority) and other activities only after consent by the undertaker (National Highways). The tunnel protection zones are detailed in the River Restrictions Plan, which was shared with the Environment Agency. Text from article 48 of the draft Development Consent Order was also shared with the Environment Agency and no comments have been received to date.	River Restrictions Plan [**Document Reference 2.14 (3)**] Draft Development Consent Order [**Document Reference 3.1 (11)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Draft DCO Requirement 6	2.1.74 WR (DL5)	In respect of Requirement 6 (contaminated land and groundwater), the Environment Agency considers that the draft DCO should refer to "land contamination" rather than "contaminated land." The term "contaminated land" is used specifically in the Contaminated Land Regulations (England) (2006) to refer to a piece of land that has been designated as such by an enforcing authority (usually a Local Authority, but in some specific cases, the Environment Agency).	The Applicant has adopted the use of 'contaminated land' given its use in several other DCOs endorsed by the Secretary of State, including A303 Stonehenge Development Consent Order 2023 and M25 Junction 28 Development Consent Order 2022. Contaminated land is consistent with the wording used in the Environmental Protection Act 1990.	Draft Development Consent Order [**Document Reference 3.1 (11)**]	Matter Not Agreed
Draft DCO Requirement 6	2.1.75 WR (DL5)	In relation to Requirement 6, sub-paragraph 2, the Environment Agency does not agree that the dDCO should give the undertaker the decision as to whether remediation is necessary or not. The decision should be based on an assessment of risk. A better approach would be to say "Where the risk assessment from (1) indicates that remediation of the contaminated land is necessary…"	The Applicant's view is that the remediation decision should lie with the undertaker in the interests of the expeditious delivery of this Nationally Significant Infrastructure Project, and in light of the additional controls relating to contaminated land in the REAC. The Applicant's approach has also been endorsed by the Secretary of State on several DCOs, such as A303 Stonehenge Development Consent Order 2023, and M25 Junction 28 Development Consent Order 2022.	Draft Development Consent Order [**Document Reference 3.1 (11)**] ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Not Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Draft DCO Requirement 6	2.1.76 WR (DL5)	The Environment Agency would like to add sub-paragraph (4) to require the undertaker to prepare and submit a Validation Report demonstrating the completion of works set out in the approved remediation strategy from (3) and the effectiveness of the remediation shall be submitted to, and approved in writing, by the Secretary of State, the relevant planning authority and the Environment Agency. The report shall include results of sampling and monitoring carried out in accordance with the approved scheme to demonstrate that the site remediation criteria have been met. Validation reports are standard practice in the Land Contamination Risk Management process. We note there is a requirement for 'the EMP2 to include plans for the management of contamination'. If that will involve validation reports then we can agree this matter.	The Applicant notes that there a number of controls in the REAC relating to contaminated land as well as the requirement in paragraph 4(2) which requires EMP2 to include plans for the management of contamination. The Applicant's drafting is in line with several other DCOs endorsed by the Secretary of State, including A303 Stonehenge Development Consent Order 2023 and M25 Junction 10/A3 Wisley Interchange Development Consent Order 2022. REAC commitment GS016 requires a verification report to be prepared by the Contractors 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 authorities and Environment Agency as a record.	Draft Development Consent Order [**Document Reference 3.1 (11)**] ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Draft DCO Requirement 8	2.1.77 WR (DL5)	The Environment Agency would like to be a consultee on Requirement 8 (surface and foul water drainage) due to its role in regulating the drainage discharges from this Project. Following the draft Development Consent Order Hearing on 11 September 2023, this has now been agreed.	The Applicant has agreed to the Environment Agency's request to be included as a consultee on Requirement 8, due to their role in regulating drainage discharges.	Draft Development Consent Order [**Document Reference 3.1 (11)**]	Matter Agreed
Draft DCO Discharge Provisions	2.1.78 WR (DL5)	The Environment Agency considers that in relation to the discharge provisions at 20(2) this provision should be for deemed refusal, not deemed consent.	These provisions do not relate to the Environment Agency and instead apply to the Secretary of State. The Applicant considers that paragraph 20 is appropriate. In circumstances where there is no consultee reporting that there are materially new or materially different effects, it is considered appropriate for the Applicant to proceed. The Applicant maintains that the current drafting is acceptable as it has already been endorsed by the Secretary of State on several other DCOs, for example A303 Stonehenge Development Consent Order 2023, or the A57 Link Roads Development Consent Order 2022.	Draft Development Consent Order [**Document Reference 3.1 (11)**]	Matter Not Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Route selection, model alternatives and assessment of reasonable alternatives					
Route Selection	2.1.9	The Environment Agency agrees that Option C is the preferred route for the Lower Thames Crossing.	Noted.	N/A	Matter Agreed
Sustainability					
Legacy and benefits	2.1.10	Further to initial concerns about the Project's approach to legacy and benefits in 2019, the Environment Agency now agrees with the approach to legacy and benefits working groups. The Environment Agency regularly attends legacy and benefits workshops, including the Marshes and Rivers sub-group of the Environment Legacy Steering Group. The Environment Agency is pleased at the progress being made by this group to organise a structure for allocating funds to environmental improvement projects. They look forward to continuing to support the group into the future.	Noted.	N/A	Matter Agreed
Terrestrial biodiversity					
Methodology & baseline	2.1.11	The Environment Agency agrees with the ecological survey methodologies.	Ecological survey methodologies have been agreed with the Environment Agency.	ES Chapter 8: Terrestrial Biodiversity [**Document Reference 6.1 ES Chapter 8 (2)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Methodology & baseline	2.1.12	Essex Field Club data should be included in the ecology baseline data.	Data received from Essex Field Club has been included in the ecology baseline.	ES Chapter 8: Terrestrial Biodiversity [**Document Reference 6.1 ES Chapter 8 (2)**]	Matter Agreed
Impact	2.1.13	Insufficient information was provided in the Preliminary Environmental Impact Report (PEIR) on potential environmental impacts, however, the level of information subsequently provided to the Environment Agency regarding environmental impacts is appropriate.	The Applicant agrees that the level of information provided to the Environment Agency is appropriate. A series of workshops have been held to discuss the Project's impact, mitigation and enhancement, along with technical meetings, where required. Drafts of the Application Documents were shared with the Environment Agency in December 2020, and the updated Application Documents have subsequently been shared, where relevant to the Environment Agency's function.	ES [**APP-138** to **APP-486**]	Matter Agreed
Impact	2.1.14 RRE	It should be assumed that eels are present in all watercourses along the LTC route. It is agreed that the Applicant's contractors will adopt best practice for eel and fish passage through culverts.	The effects on fish and eels are detailed in ES Chapter 8: Terrestrial Biodiversity which concludes no significant effects to fish and eels. The assessment assumes that eels and minor fish species are present in catchments. Good practice for the design and operation of culverts with respect to elvers is detailed in Part 10 of the	ES Chapter 8: Terrestrial Biodiversity [**Document Reference 6.1 ES Chapter 8 (2)**] Part 10 of ES Appendix 14.6: FRA [**REP7-130**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
			Flood Risk Assessment (FRA) (ES Appendix 14.6).		
Impact	2.1.15 RRE	The watercourses surrounding the Thames Estuary and Marshes directly feed into this protected area and are likely to be of high ecological value. The Applicant should not impact the flora and fauna of these watercourses during and after construction. The Environment Agency requested that further ecological and water sampling (conductivity) of the drains and ditches in and around the Thames Estuary and Marshes Ramsar was undertaken to understand how this sensitive environment works. The Environment Agency is now satisfied that sampling of water in the drains and ditches in the Ramsar is now complete. It is also agreed that the Project will need to ensure that it meets the requirement of the Environmental Permitting Regulations 2016, and apply to the Environment Agency for an environmental permit for the south portal surface water discharge if required, into the Thames Estuary and Marshes Ramsar western ditch, in line with Register of Environmental Actions and Commitments (REAC) commitment RDWE033 'Discharge from construction of South Portal' (Code of Construction	Baseline ecological and water quality surveys were undertaken in the watercourses in and adjacent to the Thames Estuary and Marshes between 2021-2022 as requested by the Environment Agency. These are presented in the ES. The impact of the Project on the Thames Estuary and Marshes has been assessed in ES Chapter 8: Terrestrial Biodiversity, which concludes that the impacts on the Site of Special Scientific Interest (SSSI) are not significant. This impact is also assessed in the HRA, which concludes there would be no Likely Significant Effects from changes in water quality. Pre-application advice has been sought from the Environment Agency regarding environmental permitting for the South Portal discharge. It is agreed that any surface water discharge into the Thames Estuary and Marshes Ramsar western ditch would need to be in line with REAC Commitment RDWE033 'Discharge from construction of South Portal'	ES Chapter 8: Terrestrial Biodiversity [**Document Reference 6.1 ES Chapter 8 (2)**] HRA [**APP-487** and **APP-488**] ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**] ES Appendix 14.7: Water Framework Directive (WFD) Assessment [**APP-478**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
		Practice (ES Appendix 2.2, Application Document 6.3)).	(Code of Construction Practice (ES Appendix 2.2)).		
Mitigation	2.1.16 RRE	Ecological mitigation and compensation should be included for the construction phase as well as for the final design. Mitigation and compensation should be in situ prior the impact.	The impacts of habitat loss in the construction and operational phases have been fully assessed in ES Chapter 8: Terrestrial Biodiversity. Habitat creation (for mitigation and compensation) will be delivered by the contactor and therefore forms part of the wider construction programme. REAC Commitment LV029 'Landscape Planting' (Code of Construction Practice (ES Appendix 2.2)) states: '*Planting identified on the Environmental Masterplan (Figure 2.4, Application Document 6.2) would be undertaken at the earliest practicable opportunity.* *Where planting is being undertaken to landscape or provide environmental mitigation on land used temporarily for the authorised development, planting for the implementation of environmental mitigation would be undertaken at the earliest practicable planting season after completion of that part of the construction works and in accordance with the LEMP.*	ES Chapter 8: Terrestrial Biodiversity [**Document Reference 6.1 ES Chapter 8 (2)**] ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**] ES Figure 2.4: Environmental Masterplan [**Document Reference 6.2 ES Figure 2.4 Sections 1 and 1a (4), Section 2 (5), Section 3 (4), Section 4 (2), Section 9 (6), Section 10 (4), Section 11 (3), Section 12 (3), Section 13 (3), Section 14 (3)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
			Planting on land taken solely for environmental mitigation purposes would be undertaken at the earliest practicable planting season following commencement of authorised development and in accordance with the LEMP.'		
Mitigation	2.1.17	Green bridges should be a sufficient size and design to function for all mammal species that currently utilise the area, as well as providing the necessary corridors for the movement of other species. The design should use contemporary evidence to establish minimum sizes and locations.	Green bridges have been individually designed to provide the greatest benefit at each crossing location for protected mammal species that currently utilise the area. For example, North Road and Muckingford Road mixed-use green bridges have been designed to accommodate terrestrial mammals and other species such as bats. Green bridge designs have been informed by best practice guidance, recent National Highways green bridge designs (for example the A556) and site-specific conditions (for example the presence of protected species and landscape requirements) to provide enhanced ecological connectivity. Full details can be found in the Design Principles and ES Chapter 8: Terrestrial Biodiversity.	Design Principles [**Document Reference 7.5 (7)**] ES Chapter 8: Terrestrial Biodiversity [**Document Reference 6.1 ES Chapter 8 (2)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Compensation and enhancement	2.1.18 RRE	The Environment Agency would expect a Project of this scale and importance to achieve net gain in line with the Government's 25 Year Environment Plan.	The Project has an aspiration to achieve Biodiversity Net Gain. Further details are provided in ES Chapter 8: Terrestrial Biodiversity. The Applicant presented its Biodiversity Net Gain results to the Environment Agency on 14 February 2023.	ES Chapter 8: Terrestrial Biodiversity [**Document Reference 6.1 ES Chapter 8 (2)**]	Matter Agreed
Marine biodiversity					
Methodology and baseline	2.1.19	The Environment Agency is satisfied with the contents of the PEIR in relation to marine water quality.	Noted.	ES Chapter 9: Marine Biodiversity [**APP-147**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impact	2.1.20 RRE	The Project should not impact the water quality of the Thames. The Environment Agency agrees with the assessment within the WFD Assessment.	Any discharges into the River Thames would be required to be permitted by the Environment Agency. Discharges would be compliant with any limits detailed in the conditions of discharge as agreed with the Environment Agency, and as set out in REAC Commitments RDWE023 'Drainage discharge to River Thames', RDWE025 'Operational drainage design', RDWE026 'Tunnel operational drainage design', RDWE028 'Northern tunnel entrance compound drainage discharge design' and GS022 'North Portal' (ES Appendix 2.2: Code of Construction Practice). Required discharges into the River Thames are detailed in ES Appendix 14.7: WFD Assessment, which has been agreed with the Environment Agency.	ES Appendix 14.7: WFD Assessment [**APP-478**] ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Compensation and enhancement	2.1.21	The Environment Agency's original position was that they would require compensation if the East Tilbury Jetty were re-purposed to be used for the Project, as the timescales involved would make it into a permanent structure. They also advised that changes to the jetty should not impact the surrounding environment, the water quality of the Thames or impact on existing flood defence infrastructure. The Applicant has subsequently removed the East Tilbury Jetty from the Project's Order Limits, which the Environment Agency welcomes.	The Applicant no longer proposes to use the East Tilbury Jetty and has removed it from the Project's Order Limits.	N/A	Matter Agreed
Material assets and waste					
Methodology and baseline	2.1.22	The Environment Agency has requested sight of the Draft Materials Management Plan (MMP). It is agreed that the Draft MMP will be shared with the Environment Agency for review when available.	Draft MMP will not be available prior to submission of the DCO application. The Draft MMP will be written by the contractor and will be shared with the Environment Agency as soon as practicable.	N/A	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Methodology and baseline	2.1.23	Any site where waste was discarded or disposed of as waste in the past (whether the site now holds a permit or not) remains waste until is it recovered or disposed of. This includes historic landfills and past exempt activities. Excavation of materials from a non-permitted site (historic) is not in itself a waste activity but the subsequent storage, treatment disposal and recovery are.	Matter agreed. The following REAC commitments (ES Appendix 2.2: Code of Construction Practice) relate to waste management activities, and have been agreed with the Environment Agency: • REAC Commitment MW007 'Excavated materials and soils' • REAC Commitment MW010 'Construction site waste management'	ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Agreed
Methodology and baseline	2.1.24	All soils should be tested prior to determining appropriate storage provisions.	Appropriate testing will be undertaken as detailed in the REAC Commitment MW010 'Construction site waste management' (ES Appendix 2.2: Code of Construction Practice).	ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Agreed
Impact	2.1.25 RRE	The East Tilbury Landfill is a historic hazardous landfill. The Environment Agency asks that nothing is built on the landfill that could impact its structure, integrity, or increase any pathways for leachate from the landfill. The Environment Agency agrees that REAC Commitment GS020 'East Tilbury access road' is appropriate.	REAC commitment GS020 'East Tilbury access road' (ES Appendix 2.2: Code of Construction Practice) has been agreed with the Environment Agency.	ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Mitigation	2.1.26	Further to comments provided on the outline Site Waste Management Plan (oSWMP) provided on 02 March 2021, the Environment Agency would like to see the pre-application draft of the document.	The draft OSWMP (ES Appendix 2.2, Annex A) was shared with the Environment Agency on 02 March 2021, and comments were received on 22 March 2021. The Environment Agency's comments have been addressed in the pre-application draft shared with the Environment Agency on 25 August 2022.	ES Appendix 2.2 Annex A: oSWMP [**Document Reference 6.3 ES Appendix 2.2 Annex A (4)**]	Matter Agreed
Road drainage and water environment					
WFD					
Methodology and baseline	2.1.27	The Environment Agency agrees with the WFD methodology.	The WFD methodology has been agreed with the Environment Agency.	ES Appendix 14.7: WFD Assessment [**APP-478**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Methodology and baseline	2.1.28 RRE	The Environment Agency advised the Applicant that the quantitative status of the South Essex Thurrock Chalk Waterbody was updated from Poor to Good in September 2022. The Applicant provided the Environment Agency with a technical note setting out any potential implications linked to the WFD status change. The Environment Agency agrees with findings of the Applicant's technical note that the change in status of the South Essex Thurrock Chalk Waterbody does not alter any of the conclusions of the WFD assessment.	Due to the timing of this update to WFD status (September 2022), it was agreed at a meeting held on 22 September 2022 that ES Appendix 14.7: WFD Assessment would not be updated to reflect this status change. The Applicant provided the Environment Agency with a technical note which concludes that the change in status of the South Essex Thurrock Chalk Waterbody does not alter any of the conclusions of the WFD assessment.	ES Appendix 14.7: WFD Assessment [**APP-478**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impact	2.1.29 RRE	The Environment Agency does not agree with the proposed culverting of watercourses. The Environment Agency has a formal policy against culverting of any watercourse because of the adverse ecological, flood risk, geomorphological, human safety and aesthetic impacts.	Where culverting cannot be avoided, embedded mitigation will be included, the full details of which can be found in the Design Principles and ES Figure 2.4: Environmental Masterplan. Further details of culverting proposals can also be found in ES Figure 14.6: WFD – Groundwater Bodies and Current Status. Culvert lengths have been minimised where practicable, for example the Tilbury Main culvert which has been reduced from 83m to 46m.	Design Principles [**Document Reference 7.5 (7)**] ES Figure 2.4: Environmental Masterplan [**Document Reference 6.2 ES Figure 2.4 Sections 1 and 1a (4), Section 2 (5), Section 3 (4), Section 4 (2), Section 9 (6), Section 10 (4), Section 11 (3), Section 12 (3), Section 13 (3), Section 14 (3)**] ES Figure 14.6: WFD – Groundwater Bodies and Current Status [**APP-327**]	Matter Not Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impact	2.1.30 RRE	The location of the North Portal means that the Lower Thames Crossing will need to cross the Tilbury Main. The Applicant is proposing a 46m culvert. Although the Environment Agency does not agree with culverting in principle, they do accept this is the least damaging option. The Environment Agency is pleased that this has reduced from the original proposal of an 83m culvert. They are also pleased that three existing culverts on the Tilbury Main, one to the east of the road alignment, and two to the west, will be removed. The Environment Agency still opposes the culverting even though the length has been reduced. It is for the applicant to make a case to the Secretary of State for Transport under Regulation 19 of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 that the culverting should be allowed.	A Choosing by Advantage Workshop was undertaken with the Environment Agency to appraise the options for a crossing over the Tilbury Main on 16 December 2019 (HE540039-CJV-GEN-GEN-MIN-DCO-00002). Although the Environment Agency objects to culverting, it was acknowledged that a culvert is the least damaging option in this location owing to the complexity, risks and impacts associated with alternative options. The culvert length has since been reduced from 83m to 46m, with the removal of three further culverts along the Tilbury Main.	ES Appendix 14.7: WFD Assessment [**APP-478**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impact	2.1.31 RRE	The Environment Agency does not agree with the loss of WFD habitat proposed by the Project. The Environment Agency's view is that the loss of WFD habitat cannot be mitigated for.	The culverting of the Tilbury Main, which results in the loss of WFD habitat, is required for the construction and operation of the tunnel approach. The Applicant agrees that the loss of WFD habitat cannot be mitigated for, but the Project design includes 3km of freshwater compensation in the Mardyke Catchment, which represents an overall increase in the provision of freshwater habitat.	ES Appendix 14.7: WFD Assessment [**APP-478**]	Matter Not Agreed
Impact	2.1.32 RRE	Although the Environment Agency does not agree with the loss of WFD habitat, the Environment Agency agrees that the freshwater enhancements will provide an overall increase in freshwater habitat.	The Applicant agrees that there would be an overall increase in the provision of freshwater habitat.	ES Appendix 14.7: WFD Assessment [**APP-478**]	Matter Agreed
Impact	2.1.33	WFD assessments should be agreed with the Environment Agency. Notwithstanding SoCG items 2.1.28, 2.1.29 and 2.1.31, the WFD assessment has been agreed with the Environment Agency.	The WFD Assessment (ES Appendix 14.7) has been agreed with the Environment Agency.	ES Appendix 14.7: WFD Assessment [**APP-478**]	Matter Agreed
Compensation and enhancement	2.1.34 RRE	The Environment Agency agrees with the relocation of freshwater habitat creation from Coalhouse Point to the Mardyke catchment due to the condition of the sea wall at Coalhouse Point.	Freshwater habitat creation has been moved to the Mardyke catchment. The Coalhouse Point land will be used as Functionally Linked Land (FLL) mitigation and for invertebrate mitigation.	ES Appendix 14.7: WFD Assessment [**APP-478**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Compensation and enhancement	2.1.35 RRE	The Environment Agency was approached by the Applicant in July 2022 to review the technical note regarding the proposed water supply for FLL mitigation adjacent to Coalhouse Fort and provided comments on 26 July 2022 (HE540039-LTC-EWE-S07-REP-ENV-00001). A meeting was arranged by the Applicant on 23 August 2022 to discuss the comments provided by the Environment Agency as outlined above. A key concluding point from this meeting was of the two options presented by LTC (1. To install a new regulated tidal exchange structure or 2. Utilise the existing drain through agreement from the Coalhouse Fort moat through agreement with Thurrock Council) the Environment Agency position would be to favour option 2 as it doesn't require disturbance of the existing embankments. If option 1 were to be pursued, engagement should be undertaken with relevant landowners and stakeholders, Statutory Environmental Bodies, local authorities and Statutory Undertakers. Only then would such an option be approved by the Environment Agency in line with 'submission and approval of plans' as required by the Protective Provisions.	The Applicant is considering options for ensuring a water supply to the FLL mitigation adjacent to Coalhouse Fort. The current proposal is to allow ingress of water from the River Thames through a water inlet with self-regulating valve as detailed in REAC Commitment RDWE049 'Water supply and water level control at Coalhouse Point wetland' (Code of Construction Practice (ES Appendix 2.2). In parallel, the potential for a formal agreement is under discussion with Thurrock Council regarding the use of existing drainage infrastructure within the Coalhouse Fort Moat. The Applicant provided initial responses to the Environment Agency's comments at a meeting on 22 August 2022, which included a request to undertake a flood risk assessment of the proposed Coalhouse Point wetland mitigation area. A further meeting to discuss flood modelling was held on 08 February 2023, and a site visit took place on 20 April 2023. The Applicant issued the Coalhouse Point hydraulic model and technical note to the Environment Agency on	HRA [**APP-487** and **APP-488**] ES Chapter 8: Terrestrial Biodiversity [**Document Reference 6.1 ES Chapter 8 (2)**] ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**] Coalhouse Point Flood Risk Assessment [**REP6-102**] Draft Development Consent Order [**Document Reference 3.1 (11)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
		The Environment Agency has reviewed the Coalhouse Point hydraulic model and technical notes provided by the Applicant and provided comments on 6 and 25 October. The Environment Agency has reviewed and is satisfied with the updated technical note shared with the Environment Agency on 31 October 2023, as detailed in Annex C.15.	21 September 2023. These were discussed at a meeting held on 26 September, and the Environment Agency provided their initial comments on 6 October 2023. The Applicant provided an updated technical note on 16 October 2023 which the Environment Agency responded to on 25 October 2023. The Applicant has addressed these comments in an updated technical note shared with the Environment Agency on 31 October 2023, and submitted at Deadline 6. The interpretation of the hydraulic modelling results demonstrates that the proposed wetland area will not have an adverse impact on flood risk elsewhere. The Environment Agency has now reviewed and accepted this technical note, as detailed in Annex C.15. The Applicant has included the Coalhouse Point Flood Risk Assessment as a certified document within Part 2 of Schedule 16 of the draft DCO.		
Hydrogeology and ground conditions					
Methodology and baseline	2.1.36 RRE	The Environment Agency agrees with the ground investigation methodology.	Methodology agreed.	ES Chapter 14: Road Drainage	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
				and the Water Environment [APP-152]	
Methodology and baseline	2.1.37 RRE	The Environment Agency agrees with the hydrogeology modelling methodology.	Methodology agreed.	ES Chapter 14: Road Drainage and the Water Environment [APP-152]	Matter Agreed
Methodology and baseline	2.1.38 RRE	The Environment Agency agrees with the groundwater monitoring regime.	Methodology agreed.	ES Chapter 14: Road Drainage and the Water Environment [APP-152]	Matter Agreed
Methodology and baseline	2.1.39	The Environment Agency advised that a suitable desk study and Water Features Survey should be completed and agreed with the Environment Agency. This desk study and Water Features Survey has been completed and agreed with the Environment Agency.	Details of the survey methodology and results are provided in the Water Features Survey Factual Report (ES Appendix 14.2). This has been accepted by the Environment Agency.	ES Appendix 14.2: Water Features Survey Factual Report [APP-454 and APP-455]	Matter Agreed
Methodology and baseline	2.1.40 RRE	The Environmental Statement should include an assessment of whether any Unexploded Ordnance (UXO) pose potential land or groundwater contamination issues.	Zetica (UXO specialists) were commissioned to undertake a report detailing likely locations of UXO and risk management protocols. This has informed the assessment included in ES Chapter 10: Geology and Soils.	ES Chapter 10: Geology and Soils [APP-148]	Matter Agreed
Methodology and baseline	2.1.41	Hydrogeological models and risk assessments should be completed and agreed with the Environment Agency.	A Hydrogeological Risk Assessment (ES Appendix 14.5) has been written and agreed with the Environment	ES Appendix 14.5: Hydrogeological Risk Assessment	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
		The Environment Agency has reviewed, and is satisfied with, the Hydrogeological Risk Assessment.	Agency, informed by pump test data and groundwater modelling as appropriate.	[APP-458 and APP-459]	
Methodology and baseline	2.1.42 RRE	Modelling should take account of Source Protection Zones (SPZs).	The ES, the Hydrogeological Risk Assessment (ES Appendix 14.5) and the mitigation requirements have been updated to reflect that part of the Project is located within a SPZ 2 and in close proximity to a SPZ 1.	ES Appendix 14.5: Hydrogeological Risk Assessment [APP-458 and APP-459]	Matter Agreed
Methodology and baseline	2.1.43	The Environment Agency highlighted the risk that the results of the hydrogeology investigations might not be received prior to DCO submission and requested that the ground investigation data and reports are shared with the Environment Agency when available. The Environment Agency is now satisfied that all ground investigation is now complete and that the results have been shared with the Environment Agency.	All hydrogeology investigations were completed in 2022, and the results are presented in the Hydrogeological Risk Assessment (ES Appendix 14.5) which has been shared and agreed with the Environment Agency.	ES Appendix 14.5: Hydrogeological Risk Assessment [APP-458 and APP-459]	Matter Agreed
Impact	2.1.44	The Project should not affect groundwater quality.	The conclusion of the Hydrogeological Risk Assessment (ES Appendix 14.5), is that the Project will not affect groundwater quality.	ES Appendix 14.5: Hydrogeological Risk Assessment [APP-458 and APP-459] ES Chapter 10: Geology and Soils [APP-148]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impact	2.1.45 RRE	Cuttings and embankments from the Project must not impact groundwater, such as impeding flow.	Assessments have been undertaken and reported in a Hydrogeological Risk Assessment (ES Appendix 14.5), informed by pump test data and groundwater modelling as appropriate. This has been agreed with the Environment Agency. The findings have informed ES Chapter 14: Road Drainage and the Water Environment.	ES Appendix 14.5: Hydrogeological Risk Assessment [APP-458 and APP-459] ES Chapter 14: Road Drainage and the Water Environment [APP-152]	Matter Agreed
Impact	2.1.46 RRE	The construction and operation of the Lower Thames Crossing must not impact existing abstractions.	Where practicable, the Project would avoid impacts on existing abstractions. Where avoidance is not practicable, the Applicant will consult with the licence holder and licensing authority to provide mitigation in the form of alternative supplies in line with landowner requirements.	ES Appendix 14.7: WFD Assessment [APP-478]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impact	2.1.47 RRE	Following the meeting held on 18 August 2022, the Environment Agency is now satisfied that the REAC item RDWE015 'Replacement of existing reservoir at Low Street', RDWE016 'Protection of landowner irrigation supply infrastructure at North Ockendon' and RDWE038 'Avoiding impacts on groundwater resources at the Thames Chase Forest Site of Importance for Nature Conservation (SINC), Hall Farm moat, paddock, and St Mary Magdalene Churchyard SINC' will ensure continuity of irrigation systems and water supply to the affected landowner, located near the M25/LTC junction.	The Applicant commits to minimising groundwater effects at the A122 Lower Thames Crossing/M25 junction during the construction and operation of the Project through REAC Commitment RDWE038. REAC Commitment RDWE015 commits to reconfigure the water supply system at Low Street, as agreed with the landowner, to maintain continuity of supply during construction and operation of the Project. Continuity of the irrigation system potentially impacted by the road alignment is secured through REAC Commitment RDWE016, which commits to providing a new supply route across the Project road, unless otherwise agreed with the landowner.	ES Appendix 14.5: Hydrogeological Risk Assessment [**APP-458** and **APP-459**] ES Appendix 14.7: WFD Assessment [**APP-478**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impact	2.1.48 RRE	The Environment Agency highlighted that the PEIR identified that lowering of groundwater levels during dewatering could increase the risk of saline intrusion potentially impacting on the designated marshes and surface water features. However, following their review of the detailed groundwater studies presented in the Hydrogeological Risk Assessment (ES Appendix 14.5, Application Document 6.3), the Environment Agency now accepts that there is no groundwater connection to the Ramsar, and saline intrusion has been discounted as a potential effect.	Sampling of water in the drains and ditches in the Thames Estuary and Marshes Ramsar site has been undertaken as part of the programme of ground investigation works undertaken between 2018-2022. This has confirmed that there is no groundwater connection to the Ramsar. The HRA concludes that there would be no significant change to surface water resulting from any groundwater changes. This is supported by the preliminary (Stage 2 assessment) hydrogeological and water balance studies (Hydrogeological Risk Assessment (ES Appendix 14.5)).	HRA [**APP-487** and **APP-488**] ES Appendix 14.5: Hydrogeological Risk Assessment [**APP-458** and **APP-459**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impact	2.1.49 RRE	The Environment Agency highlighted that the potential construction effects and mitigation north of the River Thames should consider the potential for impacts on Mucking Flats and Marshes SSSI, South Essex Chalk and the Linford public water supply. It should also include the potential for mobilisation of contamination due to dewatering near the historical landfill site. Groundwater numerical modelling of the North Portal is complete, and is reported in the Hydrogeological Risk Assessment, which has been agreed with the Environment Agency.	Groundwater numerical modelling of the North Portal has been undertaken to assess any potential impact on the Mucking Flats and Marshes SSSI, South Essex Chalk and Linford public water supply. This is reported in the Hydrogeological Risk Assessment (ES Appendix 14.5), and no significant effects have been identified. The Hydrogeological Risk Assessment has been agreed with the Environment Agency.	ES Appendix 14.5: Hydrogeological Risk Assessment [**APP-458** and **APP-459**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impact	2.1.50	North Road has been lowered by two metres, resulting in a reported potential increase of groundwater seepage into the excavations. Risks to controlled waters should be assessed in terms of quality and quantity. Dewatering requirements and discharge should be quantified and consented/permitted.	Impacts to controlled waters are assessed in Annex L: A122 Lower Thames Crossing/M25 Junction Groundwater Impact Assessment Numerical Model – Technical Note (Hydrogeological Risk Assessment (ES Appendix 14.5), which was issued to and reviewed by the Environment Agency. Further modelling work has been undertaken to quantify the impacts on controlled waters and inform mitigation requirements. Risks to controlled water, either in terms of quantity or quality, as well as mitigation measures and good construction practice, are included in ES Chapter 14: Road Drainage and the Water Environment. Prior to the excavation in this area, the Contractor(s) would need to apply to the Environment Agency to obtain the necessary dewatering/discharge permits as acknowledged in the Consents and Agreements Position Statement.	ES Appendix 14.5: Hydrogeological Risk Assessment [**APP-458** and **APP-459**] Consents and Agreements Position Statement [**Document Reference 3.3 (8)**] ES Chapter 14: Road Drainage and the Water Environment [**APP-152**] ES Chapter 10: Geology and Soils [**APP-148**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impact	2.1.81 DL7	The Environment Agency requests that REAC commitment RDWE019 is updated to require engagement with the Environment Agency on the use of any chemical additives proposed for ground treatment, tunnelling or trenchless installation. The Environment Agency has reviewed the updated commitment RDWE019 and can confirm that this matter is agreed.	Following engagement with the Environment Agency, the Applicant has updated REAC commitment RDWE019 at Deadline 7 to state: 'Chemicals and materials, such as cement, grout and lubricants used during construction would be stored, transported and used in a suitable manner to safeguard potable water supply, source protection zones and the water environment. Prior to commencement of ground treatment, tunnelling or trenchless installation the Contractor would be required to agree the use of any chemical additives proposed for the works with the Environment Agency.'	ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Agreed
Mitigation	2.1.51 RRE	The Environment Agency advised that as ground investigations were undertaken and assessment of any discovered contamination was made, the Environment Agency would require discussions regarding remediation as part of ongoing DCO assessments. The Environment Agency is now satisfied that the ground investigation works for the DCO are complete.	The ground investigation for the DCO application is complete and the results have been shared with the Environment Agency. The results are detailed in ES Chapter 10: Geology and Soils and supporting appendices.	ES Chapter 10: Geology and Soils [**APP-148**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Mitigation	2.1.52 RRE	The Environment Agency has requested the monitoring of selected boreholes at the South Portal throughout the construction phase.	The Applicant has committed to monitoring selected boreholes at the South Portal throughout construction in REAC Commitment HR008 'Groundwater Surveillance' (Code of Construction Practice (ES Appendix 2.2)).	ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Agreed
Mitigation	2.1.53 RRE	The design of all drainage systems should be submitted to the Environment Agency for review in relation to pollution prevention. Drainage designs should include sufficient treatment trains prior to discharge to surface water or infiltration to ground. The Environment Agency has reviewed and approved Part 7 of the FRA: surface water drainage strategy for the preliminary design (ES Appendix 14.6, Application Document 6.3). They have also reviewed and approved the Hydrogeological Risk Assessment (ES Appendix 14.5, Application Document 6.3), which assesses the efficiency of these measures.	Part 7 of the FRA (surface water drainage strategy for the preliminary design) sets out the outline drainage design for surface water. As described in Part 7 of the FRA, the drainage design treatment measures and the efficiency of these measures have been assessed in the Hydrogeological Risk Assessment (ES Appendix 14.5), the Operational Surface Water Drainage Pollution Risk Assessment (ES Appendix 14.3) and summarised in ES Chapter 14: Road Drainage and the Water Environment.	ES Appendix 14.6: FRA [**APP-460 to APP-464, REP1-171, APP-466 to APP-468 and REP7-130**] ES Appendix 14.5: Hydrogeological Risk Assessment [**APP-458** and **APP-459**] ES Appendix 14.3: Operational Surface Water Drainage Pollution Risk Assessment [**APP-456**] ES Chapter 14: Road Drainage and the Water Environment [**APP-152**]	Matter Agreed

Monitoring	2.1.82 (DL7)	The Environment Agency reserves the right to request further groundwater monitoring, if required, throughout the construction phase.	The Applicant has included a number of REAC commitments relating to groundwater quality during the construction phase, including commitments to monitor groundwater at specific locations across the project. Relevant commitments include: GS001, GS002, GS004, GS005, GS006, GS021, GS026, GS027, GS028, HR008, RDWE002, RDWE006, RDWE018a, RDWE038 and RDWE045. In addition to this, the CoCP states that Second iteration of the Environmental Management Plan(s) (EMP2s) will be prepared substantially in accordance with the CoCP and will include the implementation of appropriate industry-standard practice and control measures for environmental impacts during the relevant works. The Contractors will be required to develop the EMP2(s) in consultation and engagement with relevant stakeholders as listed in Table 2.1 of the CoCP, which includes the Environment Agency. Section 2.3 of the CoCP, states that the EMP2s developed by the Contractors will set out their procedures for monitoring compliance with the mitigation measures set out in CoCP relevant to the works.	ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Agreed*

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
			The EMP2s will include Contractor roles and responsibilities, together with appropriate control measures, training and briefing procedures, risk assessments, stakeholder engagement and monitoring systems to be employed. The final approach to groundwater monitoring will be developed during detailed design.		
FRA					
Methodology and baseline	2.1.54 RRE	An FRA should be included with the DCO application, and the Environment Agency should be consulted on this (including the Tilbury and Mardyke models) and should sign this off. The Environment Agency is satisfied with the Mardyke and Tilbury Main models, and the FRA.	The Environment Agency have confirmed that they are satisfied with all parts of the FRA (ES Appendix 14.6).	ES Appendix 14.6: FRA [**APP-460 to APP-464**, **REP1-171**, **APP-466 to APP-468 and REP7-130**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Methodology and baseline	2.1.55	An FRA should be prepared in line with the requirements of the National Policy Statement for National Networks (NPSNN) and the National Planning Policy Framework (NPPF) Flood Risk and Coastal Change Planning Practice Guidance. The Environment Agency agrees with the Applicant's precautionary approach where guidance differs.	The FRA has been developed in line with the requirements of the NPSNN, NPPF and National Highways' Design Manual for Roads and Bridges (DMRB). There are slight inconsistencies across these three documents; where inconsistencies have been observed, the Applicant has adopted the provisions of the most conservative. This approach has been agreed with the Environment Agency.	ES Appendix 14.6: FRA [**APP-460 to APP-464**, **REP1-171**, **APP-466 to APP-468 and REP7-130**]	Matter Agreed
Methodology and baseline	2.1.56 RRE	The Environment Agency advised that flood modelling was needed to understand the risk of flooding to the Project and the changes that the design will have on flooding. They requested to review the fluvial models and sign these off. The Environment Agency has now reviewed, and is satisfied with, the flood models for the Mardyke and Tilbury Main.	The Applicant has consulted the Environment Agency on the flood models, and they have accepted these.	ES Appendix 14.6: FRA [**APP-460 to APP-464**, **REP1-171**, **APP-466 to APP-468 and REP7-130**]	Matter Agreed
Methodology and baseline	2.1.57	Bowater's Sluice should be included within the fluvial model.	Bowater's Sluice has been included in the fluvial model.	ES Appendix 14.6: FRA [**APP-460 to APP-464**, **REP1-171**, **APP-466 to APP-468 and REP7-130**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Methodology and baseline	2.1.58	The residual design life of Bowater's Sluice is less than the design life of the Lower Thames Crossing. If it is required for flood management, its condition should be improved by the Applicant.	The fluvial model assumes that Bowater's Sluice is 100% blocked. The Project would remain operational if Bowater's Sluice failed, therefore upgrading the asset is outside of the scope of the Project. The Project will not increase surface water flood volumes and so will not increase flood risk elsewhere if Bowater's Sluice outfall fails.	ES Appendix 14.6: FRA [**APP-460 to APP-464**, **REP1-171**, **APP-466 to APP-468 and REP7-130**]	Matter Agreed
Methodology and baseline	2.1.59 RRE	The Environment Agency's initial view was the monitoring of Bowater's Sluice should be undertaken. However, they now agree with the findings of the Applicant's technical note regarding defence monitoring at Bowater's Sluice (HE540039-LTC-GEN-GEN-TNT-TPI-00001- Annex C.11) and therefore agree that monitoring does not need to be undertaken.	The Applicant has undertaken a study which concluded that defence monitoring of Bowater's Sluice is not required.	Bowaters Sluice and East Tilbury Tidal Wall Monitoring Assessment (HE540039-LTC-GEN-GEN-TNT-TPI-00001) – Annex C.11	Matter Agreed
Methodology and baseline	2.1.60	Star Dam should be included within the fluvial model.	Star Dam has been included in the fluvial model.	ES Appendix 14.6: FRA [**APP-460 to APP-464**, **REP1-171**, **APP-466 to APP-468 and REP7-130**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Methodology and baseline	2.1.61 RRE	The Environment Agency originally advised that Star Dam was in poor condition and could cause flooding to the North Portal. Their view was that if it failed, it would prevent water from the landward side from draining out into the River Thames, which will back up to the portal entrance. However, the Environment Agency now agrees with, and has signed off, the Applicant's fluvial model which indicates that a blockage of Star Dam would not cause flooding of the tunnel portal.	Fluvial modelling indicates a blockage of Star Dam would not cause flooding of the tunnel portal, since, for fluvial events up to a 1,000 year return period in 2129, post-development (with the specified floodplain compensation mitigation measures) flood extents do not reach the tunnel portal and so the blockage of Star Dam would not affect flood extents or depths.	ES Appendix 14.6: FRA [APP-460 to APP-464, REP1-171, APP-466 to APP-468 and REP7-130]	Matter Agreed
Methodology and baseline	2.1.62 RRE	The Environment Agency agreed with the approach taken to climate change in the FRA, as detailed in the technical note issued to the Environment Agency on 30 April 2020 (HE540039-CJV- EFR-TNT-ENV-00011). However, models have subsequently been re-run to reflect the latest peak river flow allowances released in 2021 and have been agreed with the Environment Agency.	Models have been re-run to reflect the latest peak river flow allowances released in 2021 and have been agreed with the Environment Agency.	ES Appendix 14.6: FRA [APP-460 to APP-464, REP1-171, APP-466 to APP-468 and REP7-130]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Methodology and baseline	2.1.63	The Environment Agency informed the Applicant on 04 May 2022 that be new peak rainfall allowances would be published on 09 May 2022. The Environment Agency has informed the Applicant that the upper end allowance is unlikely to change significantly from what is published and, in most locations, it will be 40–45%. Where work is within 5% of the updated allowance, the Applicant will not be required to re-run the assessment.	The Environment Agency has confirmed that the updated climate change allowance is within 5% and therefore the fluvial model does not need to be re-run.	ES Appendix 14.6: FRA [**APP-460 to APP-464**, **REP1-171**, **APP-466 to APP-468 and REP7-130**]	Matter Agreed
Methodology and baseline	2.1.64	The Environment Agency advises that the Lead Local Flood Authority (LLFA) should be consulted on the drainage designs and that comments should be shared with the Environment Agency.	Drainage designs have been shared with the LLFA, and comments have been shared with the Environment Agency.	ES Appendix 14.6: FRA [**APP-460 to APP-464**, **REP1-171**, **APP-466 to APP-468 and REP7-130**]	Matter Agreed

Methodology and baseline	2.1.80 WR (DL5)	The updated Thames Estuary 2100 Plan (May 2023), with supporting extreme water levels for a range of tidal return periods and climate change scenarios, has been published since the draft DCO was submitted. In addition, the government's Ministerial Statement has delayed the planned completion of the Project by 2 years. A draft update of the NPSNN including provisions for assessing credible maximum climate change scenarios and adaption is also currently under consultation. The Environment Agency has asked the applicant to review if this information has any implications for the Flood Modelling and Flood Risk Assessment. The Applicant provided two technical notes 'Allowing for new information since completing the DCO Application Flood Risk Assessment' (Annex C.13 to this SoCG) and 'Adaptive Design' (Annex C.18 to this SoCG) to respond to this query on 16 October 2023. The Environment Agency has reviewed the technical notes and now considers this matter to be agreed as confirmed in Annexes C.14 and C.19.	The Applicant has reviewed the Environment Agency's Deadline three submissions in relation to the updated Thames Estuary 2100 Plan, extreme water levels and the Ministerial Statement and has undertaken technical engagement with the Environment Agency on these matters. This includes meetings held on the 23 August 2023 and 26 September 2023. The Applicant issued two technical notes to the Environment Agency on 16 October 2023. 'Allowing for new information since completing the DCO Application Flood Risk Assessment' (Annex C.13 to this SoCG) considers the updated Extreme Water Levels, the revised Thames 2100 Plan (Defra, 2023) and the impact of the Government's Ministerial Statement. This technical note concludes that there is no significant impact on the conclusions of the Flood Risk Assessment. The implications of new elements of the draft NPSNN related to climate change adaptation have been reviewed and set out in a technical note in Annex C.18. This note presents a sensitivity test of the design to the credible maximum climate change scenario and demonstrates that the flood protection	ES Appendix 14.6: FRA [**APP-460 to APP-464**, **REP1-171**, **APP-466 to APP-468 and REP7-130**] Environment Agency's Deadline 3 submission [**REP3-158**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
			measures at the North Portal are adaptable to this scenario. The findings of the note do not affect the outcomes of the FRA or design as presented in the DCO application. The Project is resilient to future climate change and the conclusions have been accepted by the Environment Agency as the statutory regulator. The Environment Agency confirmed that they now consider these matters to be agreed on 24 October 2023 and 8 December 2023, as detailed in Annexes C.14 and C.19 to this SoCG.		
Impacts	2.1.65	There should be no net loss in floodplain storage resulting from the Project. The Lower Thames Crossing must also not impede flood flow and/or reduce storage capacity thereby increasing the risk of flooding elsewhere. Any loss of storage must be compensated, and compensation should be agreed with the Environment Agency.	The FRA (ES Appendix 14.6) demonstrates compliance with these requirements. Fluvial floodplain compensation would be provided on a hydraulically linked level-for-level basis in the Mardyke catchment. Providing level-for-level compensation is not possible in the Tilbury Main catchment due to the low-lying and flat floodplain. Instead, compensation would be largely provided to intercept upstream flows, and has been assessed through hydraulic modelling.	ES Appendix 14.6: FRA [**APP-460 to APP-464, REP1-171, APP-466 to APP-468 and REP7-130**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impacts	2.1.66 RRE	The Environment Agency advised that the design of Project should not impact on the existing flood defence assets. A monitoring program should be agreed with the Environment Agency and should include baseline, construction, and operational surveys to ensure there is no impact to any assets. The Environment Agency has now confirmed that they are satisfied with REAC Commitment RDWE007 'Protection of flood defences from ground movement'.	The Applicant has committed to monitor flood defences to establish a pre-construction baseline and for at least two years after completion of works, in line with REAC Commitment RDWE007 'Protection of flood defences from ground movement' (Code of Construction Practice (ES Appendix 2.2)).	ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impacts	2.1.67	The Environment Agency requires access for maintenance and operation of all flood risk assets, and this should be included in the final design of the Project. Access should be maintained throughout the construction and operational phases. Where changes are made by the Applicant, maintenance should be carried out in the future by agreed parties.	The Applicant's proposals would not compromise the Environment Agency's ability to maintain and operate their assets. For example, where the Project crosses the Mardyke, Orsett Fen Sewer and Golden Bridge Sewer, to protect riverbanks and facilitate Environment Agency access to these watercourses for future maintenance, a bankside access track would be incorporated into the design of the crossings, the width of which would be subject to agreement with the Environment Agency as detailed in Design Principle S12.05 'Height of the Mardyke and Orsett Fen Viaducts'.	Draft Development Consent Order [**Document Reference 3.1 (11)**] Design Principles [**Document Reference 7.5 (7)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impacts	2.1.68 RRE	In the future, the flood defences along the River Thames may be raised on their current alignment. If this is the case, Environment Agency modelling indicates that the likely the design crest level would be 8m Above Ordnance Datum (AOD) by 2070. The possible raising options include: • Earth embankment • Earth embankment with wall upstand • Earth embankment with sheet pile • Earth embankment with controlled modulus The Applicant should demonstrate that these options could be implemented without impacting on the tunnel. The Environment Agency is now content with the text included in the Contractor's specification.	The following text, as agreed with the Environment Agency, has been included in the contract scope: "*The tunnel lining shall be designed to accommodate the load of a future increase in river flood defences height to 8.0m AOD. Methods of raising may include:* • *Earth embankment* • *Earth embankment with wall upstand* • *Earth embankment with sheet pile* • *Earth embankment with controlled modulus"*	N/A	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Impacts	2.1.69 RRE	Flood Warning and Evacuation Plans should be produced for compounds located within Flood Zone 3.	The production of an evacuation plan and flood warning system would form part of the safety components of any site compound. The Applicant has also agreed the following REAC commitments with the Environment Agency (ES Appendix 2.2): • REAC Commitment RDWE022 'A226 Gravesend Road, Milton, northern tunnel entrance, Station Road and Mardyke compounds. Construction flood risk'. • REAC Commitment RDWE001 'Construction flood risk'.	ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Agreed
Impacts	2.1.70 RRE	Any utility crossings such as temporary crossings, or walker, cyclist and horse rider (WCH) routes requiring a permit should have modelling to support the application to show no increases in flood risk. The Environment Agency reserves the right to require further modelling or detail about utility crossings once the exact locations are known.	Highway crossings (including WCH crossings) are detailed in Part 10 of the FRA (ES Appendix 14.6). Specific crossings have not been modelled, and this is not currently within the scope of the modelling. Generally, changes in flood levels are within ±10mm, which is classified by the Applicant as 'negligible'. REAC Commitment RDWE008 'Protection of watercourses during utility works' (Code of Construction Practice (ES Appendix 2.2)) commits to the use of trenchless techniques for crossing watercourses.	ES Appendix 14.6: FRA [**APP-460 to APP-464, REP1-171, APP-466 to APP-468 and REP7-130**] ES Appendix 2.2: Code of Construction Practice [**Document Reference 6.3 ES Appendix 2.2 (9)**]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
Compensation and enhancement	2.1.71	The Environment Agency originally requested that any flood structure should be designed at a height to protect from future water level rise, or to enable retrofitting in the future. The Applicant's commitment not to compromise the Environment Agency's ability to maintain and raise assets in the future is agreed and has been confirmed by the Environment Agency's acceptance of the FRA and fluvial models.	Raising of Environment Agency flood defences is outside of the scope of this Project. However, the proposals should not compromise the Environment Agency's ability to maintain and raise these defences in the future.	ES Appendix 14.6: FRA [APP-460 to APP-464, REP1-171, APP-466 to APP-468 and REP7-130]	Matter Agreed
Compensation and enhancement	2.1.72 RRE	The Environment Agency requested that flood compensation in the Mardyke should be agreed with the Environment Agency. Flood compensation has now been agreed with the Environment Agency.	The Mardyke flood compensation has been agreed with the Environment Agency.	ES Appendix 14.6: FRA [APP-460 to APP-464, REP1-171, APP-466 to APP-468 and REP7-130]	Matter Agreed
Cumulative effects					
Methodology and baseline	2.1.73 RRE	The proposals and future options in the Thames Estuary 2100 (TE2100) Plan need to be taken account of by the Applicant, including the provision of a future Thames Barrier. The Environment Agency agrees with the approach set out in the Future Thames Barrier breach modelling technical note (HE540039-CJV-EFR-GEN-TNT-ENV-00101).	The TE2100 Plan and its context in relation to the Project is included in Part 2 of the FRA (ES Appendix 14.6). A review of the potential impact that the Project may have on the TE2100 Plan is included in Part 6 the FRA (ES Appendix 14.6). The location options for the new Thames Barrier proposed in the TE2100 Plan are located outside the	ES Appendix 14.6: FRA [APP-460 to APP-464, REP1-171, APP-466 to APP-468 and REP7-130]	Matter Agreed

Topic	Item No.	Environment Agency Comment	The Applicant's Response	Application Document Reference	Status
			Order Limits and so have not been considered in the ES. A technical note was issued to the Environment Agency on the Future Thames Barrier breach modelling (HE540039-CJV-EFR-GEN-TNT-ENV-00101), and the Environment Agency agreed with the approach set out in it. This technical note is included as an appendix to the FRA (ES Appendix 14.6).		

Appendix A Engagement Activity

Table A.1 Engagement activities between the Applicant and the Environment Agency since the DCO Application was submitted on the 31 October 2022

Date	Overview of Engagement Activities
02 November 2022	Fortnightly catch-up meeting to discuss the DCO application and to highlight that the DCO Application Documents were available for the Environment Agency to access on SharePoint.
16 November 2022	DCO walkthrough presentation to provide stakeholders a summary of where to find relevant DCO Application Documents.
16 November 2022	Fortnightly catch-up meeting to discuss SoCG items and plan upcoming engagement.
22 November 2022	Meeting to discuss the Esso Petrol Station site
25 November 2022	Stakeholder biodiversity and ecology briefing, including impact, mitigation and compensation proposals and the associated biodiversity value
30 November 2022	Fortnightly catch-up meeting to discuss the SoCG and to provide an update on actions.
14 December 2022	Fortnightly catch-up meeting to discuss Relevant Representations, Protective Provisions and the Service Level Agreement.
11 January 2023	Fortnightly catch-up meeting to discuss likely timescales for DCO Examination, the Service Level Agreement, and to provide an update on the Coalhouse Point mitigation land.
17 January 2023	Area Manager Meeting to discuss the likely DCO programme and PADS.
25 January 2023	Fortnightly catch-up meeting to discuss ongoing actions, and to plan the future schedule of engagement.
01 February 2023	Environmental Permitting Strategy Workshop 7
07 February 2023	Area Manager Meeting to discuss Relevant Representations, PADS, and progression of matters under discussion in the SoCG.
07 February 2023	Meeting to discuss Cobham Petrol Station site.
08 February 2023	Meeting to discuss the proposed Coalhouse Point flood modelling simulations.
08 February 2023	Fortnightly catch-up meeting to discuss the SoCG and to provide an update on actions.
14 February 2023	Meeting to discuss Biodiversity Net Gain
22 February 2023	Fortnightly catch-up meeting to discuss SoCG matters and PADS.
07 March 2023	Area Manager Meeting to discuss the Environment Agency's Relevant Representations response, and to provide an update on the permitting workstream

Date	Overview of Engagement Activities
08 March 2023	Fortnightly catch-up meeting to present the findings of National Highways' assessment of the updated WFD status of the South Essex Thurrock Chalk Groundwater Body.
21 March 2023	Environmental Permitting Strategy Workshop 8
22 March 2023	Fortnightly catch-up meeting to discuss the SoCG review process.
05 April 2023	Fortnightly catch-up meeting to discuss the Service Level Agreement, comments on the proposed modelling of Coalhouse Point and Balfour Beatty's FRAP.
17 April 2023	Stakeholder Landscape and Ecology Working Group (option A)
19 April 2023	Fortnightly catch-up meeting to discuss the SoCG and to provide an update on actions.
20 April 2023	Site visit to Coalhouse Point to discuss the proposed ecological mitigation site.
02 May 2023	Area Manager Meeting to discuss the Rule 6 Letter, ways of working during Examination and to provide an update on the permitting workstream
02 May 2023	Stakeholder Landscape and Ecology Working Group (option B)
03 May 2023	Fortnightly catch-up meeting to discuss the SoCG and to provide an update on actions.
09 May 2023	Briefing on the assessment of groundwater and contamination detailed in the ES.
17 May 2023	Fortnightly catch-up meeting to discuss the Service Level Agreement, the public consultation, protective provisions and Coalhouse Point modelling.
17 May 2023	Stakeholder briefing on the public consultation material.
25 May 2023	Environmental Permitting Strategy Workshop 9
13 June 2023	Area Manager Meeting to discuss the Examination timetable, upcoming engagement and the Service Level Agreement.
14 June 2023	Fortnightly catch-up meeting to discuss the agenda for the flood modelling meeting.
20 June 2023	Meeting to provide an update on the flood modelling at Coalhouse Point.
28 June 2023	Fortnightly catch-up meeting to discuss the Rule 8 letter, programme for sharing SoCGs, the permitting strategy and the Linford Water Supply.
12 July 2023	Fortnightly catch-up meeting to discuss the draft environmental permitting strategy, Written Representations and the water supply at Manor Farm.
26 July 2023	Fortnightly catch-up meeting to discuss the upcoming schedule of engagement.
01 August 2023	Area Manager Meeting to discuss Written Representations and to provide an update on the Coalhouse Point flood modelling.

Date	Overview of Engagement Activities
09 August 2023	Fortnightly catch-up meeting to discuss responses to Written Representations and the schedule for updating the SoCG.
17 August 2023	Meeting with the Environment Agency to discuss Protective Provisions.
23 August 2023	Meeting with the Environment Agency to discuss updated guidance on extreme water levels, Thames Estuary 2100 and flood modelling at Coalhouse Point.
29 August 2023	Environmental Permitting Strategy workshop 10.
05 September 2023	Meeting with the Environment Agency to discuss the proposed new article (68) within the draft DCO 'Interface with waste operation permits'
14 September 2023	Meeting with the Environment Agency to discuss groundwater monitoring
22 September 2023	Fortnightly catch-up with the Environment Agency to discuss the SoCG and the programme of engagement.
26 September 2023	Meeting with the Environment Agency to discuss Coalhouse Point modelling.
28 September 2023	Meeting with the Environment Agency to discuss groundwater quality monitoring and commitments relating to tunnelling polymers/additives
04 October 2023	Fortnightly catch-up meeting to discuss the SoCG and the schedule of future meetings.
11 October 2023	Area Manager Meeting to discuss the Examination and engagement relating to flood risk.
17 October 2023	Meeting to discuss permitting and the draft Order.
18 October 2023	Meeting with the Environment Agency to discuss the SoCG.
20 October 2023	Environmental Permitting Strategy workshop 11.
7 November 2023	Area Manager Meeting to provide an update on the SoCG and to discuss future resourcing.
7 November 2023	Meeting to discuss permitting and the draft Order.
10 November 2023	Environmental Permitting Strategy workshop 12.
13 November 2023	Meeting to discuss third party permits.
15 November 2023	Fortnightly catch-up meeting to discuss the SoCG.
16 November 2023	Meeting to discuss the proposed drafting of article 68.
27 November 2023	Meeting to discuss article 68.

Appendix B Glossary

Term	Abbreviation	Explanation
Above Ordnance Datum	AOD	Vertical datum used by the Ordnance Survey as the basis for deriving altitudes on maps.
Design Manual for Roads and Bridges	DMRB	A comprehensive manual which contains requirements, advice and other published documents relating to works on motorway and all-purpose trunk roads for which one of the Overseeing Organisations (National Highways, Transport Scotland, the Welsh Government or the Department for Regional Development (Northern Ireland)) is the highway authority. For the A122 Lower Thames Crossing, the Overseeing Organisation is National Highways.
Development Consent Order	DCO	Means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects (NSIP) under the Planning Act 2008.
Environmental Permitting (England and Wales) Regulations 2016 (as amended)	EPR	These Regulations provide a consolidated system of environmental permitting in England and Wales.
Environmental Statement	ES	A document produced to support an application for development consent that is subject to Environmental Impact Assessment (EIA), which sets out the likely impacts on the environment arising from the proposed development.
Flood Risk Activity Permit	FRAP	Flood Risk Activity Permit
Flood Risk Assessment	FRA	An assessment of the risk of flooding from all flooding mechanisms, the identification of flood mitigation measures, and identification of actions to be taken before and during a flood.
Functionally Linked Land	FLL	Functionally linked land is habitat used by the birds outside the European site boundary.
Lead Local Flood Authority	LLFA	LLFAs are county councils and unitary authorities. They lead in managing local flood risks (i.e., risks of flooding from surface water, ground water and ordinary (smaller) watercourses). This includes ensuring co-operation between the Risk Management Authorities in their area. The LLFA for the M25 area is Essex County Council who is acting on behalf of Thurrock.
Materials Management Plan	MMP	Materials Management Plan

Term	Abbreviation	Explanation
National Planning Policy Framework	NPPF	The National Planning Policy Framework was published in March 2012 by the UK's Department of Communities and Local Government, consolidating over two dozen previously issued documents called Planning Policy Statements (PPS) and Planning Practice Guidance Notes (PPG) for use in England. The NPPF was updated in February 2019 and again in July 2021 by the Ministry of Housing, Communities and Local Government.
National Policy Statement for National Networks	NPSNN	The NPSNN sets out the need for, and Government's policies to deliver, development of Nationally Significant Infrastructure Projects on the national road and rail networks in England. It provides planning guidance for promoters of Nationally Significant Infrastructure Projects on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State.
Outline Site Waste Management Plan	oSWMP	A document which sets out how resources will be managed, and waste controlled during the Project. Plans usually involve recording the amount of waste that will be produced and details the proposed methods of waste disposal.
Preliminary Environmental Impact Report	PEIR	An early output of the EIA process, and part of the DCO application process.
Register of Environmental Actions and Commitments	REAC	The REAC identifies the environmental commitments that would be implemented during the construction and operational phases of the Project if the Development Consent Order is granted, and forms part of the Code of Construction Practice (Application Document 6.3, ES Appendix 2.2).
Site of Importance for Nature Conservation	SINC	Locally designated nature site protected through the planning system
Site of Special Scientific Interest	SSSI	A conservation designation denoting an area of particular ecological or geological importance.
Source Protection Zone	SPZ	EA-defined groundwater sources (2000) such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area.
Thames Estuary 2100	TE2100	An Environment Agency project (formed November 2012) to develop a comprehensive action plan to manage flood risk for the Tidal Thames from Teddington in West London, through to Sheerness and Shoeburyness in Kent and Essex.

Term	Abbreviation	Explanation
Unexploded Ordnance	UXO	Explosive ammunition that did not explode when they were deployed and still pose a risk of detonation. Sometimes referred to as UXBs.
Walkers, cyclists and horse riders	WCH	Walkers, cyclists and horse riders
Water Framework Directive	WFD	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. The Directive establishes a framework for the protection of inland surface waters, estuaries, coastal waters and groundwater. The framework for delivering the WFD is through river basin management planning. The UK has been split into several river basin districts. Each river basin district has been characterised into smaller management units known as water bodies. The surface water bodies may be rivers, lakes, estuary or coastal.

Appendix C Documents considered within this Statement of Common Ground

C.1.1 A summary of the documents which have been considered in the development of this SoCG outside of the DCO application documents are provided below, such as emails, meeting notes, etc and are included as annexes to this Appendix:

a. Annex C.1: Environment Agency Statutory Consultation Response

b. Annex C.2: Environment Agency Supplementary Consultation Response

c. Annex C.3: Environment Agency Design Refinement Consultation Response

d. Annex C.4: Environment Agency Community Impact Consultation Response

e. Annex C.5: Environment Agency Local Refinement Consultation Response

f. Annex C.6: Tilbury Main Diversion Options, Choosing By Advantage Light (HE540039-CJV-GEN-GEN-MIN-DCO-00002)

g. Annex C.7: WFD Implications of Culverting Tilbury Main (HE540039-CJV-GEN-GEN-MIN-STK-00801)

h. Annex C.8: Coalhouse Point Mitigation Water Supply Structure (HE540039-LTC-EWE-S07-REP-ENV-00001)

i. Annex C.9: Flood Risk Assessment – Climate Change (HE540039-CJV-EFR-TNT-ENV-00011)

j. Annex C.10: Flood Risk Assessment – Future Thames Barrier Breach Modelling (HE540039-CJV-EFR-GEN-TNT-ENV-00101)

k. Annex C.11: Bowaters Sluice and East Tilbury Tidal Wall Monitoring Assessment (HE540039-LTC-GEN-GEN-TNT-TPI-00001)

l. Annex C.12: Agreed Statements

m. Annex C.13: Allowing for new information since completing the DCO Application Flood Risk Assessment

n. Annex C.14: Environment Agency acceptance of LTC's 'Allowing for new information since completing the DCO Application Flood Risk Assessment' technical note

o. Annex C.15: Environment Agency acceptance of LTC's 'Coalhouse Fort Flood Risk Assessment and Modelling'

p. Annex C.16: Outline Environmental Permitting Strategy

q. Annex C.17: Environment Agency's acceptance of the outline Environmental Permitting Strategy

r. Annex C.18: Adaptive Design Technical Note

s. Annex C.19: Environment Agency Acceptance of LTC's Adaptive Design Technical Note

Annex C.1 Environment Agency Statutory Consultation Response

creating a better place

Environment Agency

[redacted]

Our ref: KT/2018/124865/01-L01
Your ref: Lower Thames Crossing
Date: 19 December 2018

[redacted]

Section 42 Planning Act 2008 consultation on Lower Thames Crossing – Preliminary Environmental Report (PEIR)

Lower Thames Crossing

Thank you for consulting us on the current Lower Thames Crossing proposals and the Preliminary Environmental Information Report (PEIR).

Based on the information provided the PEIR does not provide all the information that we expected. If an application for development was made using it, we would object to the application due to insufficient information, details of which are below.

We welcome the fact that you have set up regular meetings with us to discuss the requirements of your development in relation to our remit. We also recognise that there have been changes to the scheme designs and locations in response to the environmental information, constraints, and our advice.

Our concerns are as follows:

- **Baseline data and survey information**
  The PEIR does not contain the environmental survey and baseline data for us to fully assess the impacts of the scheme. This information should be used to inform the design of the scheme.

  We would expect that as more information comes available the scheme design will change to ensure that the environment is protected and enhanced, meeting the needs of people and wildlife. Without this information and design changes we would maintain our objection at the submission stage.

- **Environmental protection and enhancement**
  We would expect a scheme of this scale and importance to be providing more environmental improvement and benefit than is shown in the current designs. The 25 Year Environment Plan has a commitment to embed net environmental gain into development, including infrastructure.

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Due to the scale of the scheme and length of time needed for construction we would expect a greater environmental legacy than that proposed. This development has the opportunity to maximize benefits for people, wildlife and the economy. These opportunities should not be missed.

- **Safeguarding for the future**
  We expect the whole life span of the development to be designed in line with the Thames Estuary 2100 plan taking account of the UKCP18 climate change levels. This includes having a robust design that can be retro fitted in line with future information and flood protection changes.

We have provided specific comment on the document in the pages that follow. Please note, we may need to add to or amend the matters set out in this response as further information is provided.

We look forward to continuing to work with you in progressing the points above as the scheme develops including the opportunities to maximise the environmental benefits.

Yours sincerely

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Further comments

These comments relate to flood risk, groundwater and contaminated land, waste and biodiversity specifically and have been split into sections accordingly.

Flood Risk

General comments

The data regarding tidal defences benefitting the project within Essex is not complete and misses the Environment Agency maintained tidal defences at both Star Dam (inland of Coalhouse Fort) and Bowaters Wall / Sluice. Both these locations are 0.1% Annual Exceedance Probability (AEP) defences.

The Bowaters Sluice outfall which provides drainage to the West Tilbury Main Catchment has suffered from significant subsidence and is no longer functioning correctly. The residual life of the structure is significantly less than the design life of the LTC and will require replacement to provide drainage to the scheme.

We are pleased that the South Portal is located within Flood Zone 1. If there are any surface works within the "temporary use of land required" (LTC #13b Map book 2) and within Flood Zone 2 and 3 we would expect these to be detailed within the Flood Risk Assessment and the flood risk and potential impacts appropriately assessed and mitigated. If any works are proposed near to the flood defences we would want to ensure our ability to access the defences to undertake maintenance is not affected.

Flood Risk Activity Permits

We would advise you that a Flood Risk Activity Permit may be required under the Environmental Permitting (England and Wales) Regulations 2016 if you want to do work

- Within 8m of the bank of a main river, or 16m if it is a tidal main river
- Within 8m of any flood defence structure or culvert on a main river, or 16m on a tidal main river

Further guidance on applying for Flood Risk Activity Permits can be found on the following link https://www.gov.uk/guidance/flood-risk-activities-environmental-permits

In particular the potential drainage outfall mentioned on LTC#13a Map book 1, Sheet 7, General Arrangement Plan and the potential temporary jetty are likely to require a Flood Risk Activity Permit.

Please also be aware that any new jetty, or modification to an existing jetty, will require consideration from us in terms of the impact this may have on existing flood defence infrastructure and the impact upon the Thames Estuary.

Document Specific Comments

LTC #1 - PEIR Volume 1

2.13 Flood Risk Mapping
Make reference to a Flood Zone Map and include this map

2.13.2
refer to the Tilbury Main River not just the Tilbury marshes

2.13.3
separate the areas – Refer to Tilbury Marshes defences and sluices (Star Dam and Bowater Sluice) an then refer to Orsett Fen Sewer and how it is defended.

2.13.4
These comments need to be expanded upon. It must be determined that the project will not result in a net loss in floodplain storage. Furthermore it must show that the proposed development will not impede flood flow and/or reduce flood storage capacity thereby increasing the risk of flooding elsewhere.

Where sections of the Project fall within tidal Flood Zone 3 the picture of flood risk will need to be painted to show the changes to risk. How does the flood hazard (depth, rate of onset, velocity) change as a result of what is being proposed. Areas of compensation will be required if there is significant change in hazard category.

2.13.5
It will need to be shown that any increase in built footprint within the 1% (1 in 100) annual probability flood extent, including allowances for climate change, can be directly compensated for on a volume-for-volume and level-for-level basis to prevent a loss of floodplain storage. If there are no available areas for compensation above the design flood level and compensation will not be possible then a calculation of the offsite flood risk impacts will need to be undertaken.

2.13.8
The following should be added to the points in this section:

h. connectivity of the flood cells and requirements for culverts through the embankments
i. the volume available for breached flows to accumulate behind the sea defences
j. how the project will impact the rate of inundation

2.18 Construction Work
2.18.1
The following should be added to the points in this section:

g. Flood defence and sluice improvement work

Compound Locations (page 34)
2.18.15
The following should be added to the points in this section:

h. Flood Warning and Evacuation Plan for those locations within Flood Zone 3.

2.20 Rest and Service Area
This is in a Flood Zone and will need to be constructed to ensure it is not at risk from flooding or increase the risk of flooding elsewhere

Third party asset protection (page 38)
Need to mention that there will be monitoring of existing flood defences assets during construction phase to ensure there is no detrimental impact to the defences and that monitoring will be continued post construction phase.

11.5.3 Further baseline information and surveys required
We would welcome the results of any geotechnical/pre-condition surveys undertaken that relate to the flood defences.

Chapter 15 - Road Drainage and Water Environment
Table 15.2
Mentions the UKCP09. Needs to be updated to the UKCP18 as they have now been released.

15.4.46
Fluvial and tidal flood risk zones and flood defence assets are illustrated in Figure 15.3 in Volume 3.

15.4.48 and 15.4.60 (Flood risk and flood defences)
Please be aware that the proposed drainage outfall mentioned on LTC#13a Map book 1, Sheet 7, General Arrangement Plan would be within the Policy P4 area - Gravesend unit. Therefore, any works should take account of the need to maintain and raise these defences in the future. We would welcome a conversation to discuss the impact on the tidal defences in more detail.

Policy P4 area - Gravesend unit: Maintain the current standard of protection which will require raising to take account of climate change.

Policy P3 area – North Kent Marshes unit: Maintain the current height of the defences excepting that the standard of protection will reduce with climate change.

Flood risk and Defences (page 509)
15.5.2
We would like the following (*shown in italic*) to be added into the existing text:

An FRA will be prepared in line with the requirements of the NPSNN and the National Planning Policy Framework Flood Risk and Coastal Change Planning Practice Guidance (Ministry of Housing, Communities and Local Government,

2014). The assessment is currently being scoped in consultation with the Environment Agency and will be informed by hydrological and hydraulic modelling of key river systems including the Tilbury Main, the Mardyke and its tributaries (the Orsett Fen Sewer and the Golden Bridge Sewer). In addition, breach of the Thames' defences will be modelled and the subsequent flood risk to the Project assessed. A topographical survey will be undertaken, and the data used to develop models of these watercourses and their floodplains. *The findings of the modelling studies will be reported in an FRA that defines baseline flood risk and informs the design of any flood risk management measures that may be necessary.* These findings will also inform the Road Drainage and Water Environment Chapter of the Environmental Statement.

The highlighted sentence should also say:
The findings of the modelling studies will be reported in an FRA that defines baseline flood risk and also the as built flood risk which *informs the design of any flood risk management measures* and mitigation *that may be necessary.*

Table 15.10
We would expect to understand what monitoring of the tidal defences you will undertake to ensure there is no detrimental impact to the defences (and any associated infrastructure) during and after works have been completed. The applicant would need to agree a programme of monitoring with the Environment Agency and the actions required if any damage to the defences occurs.

It also mentions potential scour protection for the tunnel would require works to the bed of the river. Any works should be agreed with the Environment Agency.

16.2.2
We welcome the project response in table 16.3 that the UKCP18 data will be applied in the ES to cover the estimated lifetime of the project. Please contact the Environment Agency to obtain any potential changes in modelled flood information, approach or impact on flood risk management in the project area as a result of a change in UKCP data.

Table 16.11
Must also include 0.1% (1 in 1000) cc

LTC #3 - Design consultations and operations

4.8.4
This watercourse is called the West Tilbury Main. The main rivers crossed close to the northern portal are known as 'West Tilbury Main', 'West Tilbury West Branch Sewer' and 'West Tilbury North Branch Sewer'. We welcome the comments in paragraph 4.8.5 which confirms that these rivers shall be maintained and comply with the requirements of the Environment Agency and other relevant authorities.

15.5.4
We note the preferred option for crossing the 3 main rivers in this area. These will require a bespoke permit under the Environmental Permitting Regulations.

18.3.4
We note a staged approach is proposed for the provision of flood storage. Details of the staged approach will be supported by detailed flood risk modelling, which will provide sufficient evidence to demonstrate that the works will not result in any increases to flood risk, both upon completion of the project and during the construction phases.

LTC #4a - PEIR Figures (3b)

Figure 11.10- Slope Stability Sheet 2 of 3
Please provide confirmation of where the data has been sourced to inform this map e.g. was it a desktop study or a detailed investigation.

Figure 11.11- Shrink Swell- Running Sands, Sheet 2 of 3
Please provide confirmation of where the data has been sourced to inform this map e.g. was it a desktop study or a detailed investigation.

Groundwater and contaminated land

General comments
The PIER report identifies lowering of groundwater levels during dewatering could increase the risk of saline intrusion potentially impacting on the designated marshes and surface water features.

In order for us to fully assess the likely impacts that may arise from dewatering. Further ecological and water sampling (conductivity) of the drains and ditches in and around the Ramsar need to be undertaken to understand how this sensitive environment works.

Any lowering of groundwater levels must ensure springs and seepages continue to support flow and levels in surface water drains and groundwater-fed ponds.

As of 1 January 2018 previously exempt water abstractors, such as trickle irrigation, dewatering, navigation and others are now a regulated activity to meet the requirements of the Water Framework Directive. Please ensure these new licensed activities, listed under the Water Act 2003, are included in future Water Features Survey.

We look forward to receiving the Hydrogeological Risk Assessment report and further proposal details on dewatering in due course.

The scope of the Environmental Statement and the outline PEIR is accepted as being in line with what is expected for such a significant project for the south bank of the project. In relation to land quality issues; contamination and landfill especially, further ground investigations are crucial to formalising design for the tunnel, roadway and drainage in addition to addressing historic contamination appropriately. Any remediation in the context of the National Planning Policy Framework (NPPF) requirements for sustainable development and environmental betterment and protection must be agreed in detail with relevant regulators prior to any works.

LTC#1 - PEIR Volume 1

Section 2 - Project Description

S.2.7.2
Detailed impact assessments concerning changes to flow and supported surface water body functioning will be required for all cuttings and embankments into the shallow and deep aquifers.

S.2.7.3
Full assessments of the impact of below ground structures on the chalk aquifer with regards to flow and the water quality will be required for construction and operation with particular focus needed on the potential for saline intrusion and contamination mobilisation impacts on dewatering.

S.2.9.1b
Details of the methods for the proposed crossings at Tilbury Main and Mar Dyke are required.

S.2.9.3
The design for all drainage systems will need to be submitted for review and should include sufficient treatment trains prior to discharge to surface water or infiltration to ground; details of operational maintenance programs will also be needed.

S.2.18.11
Any proposals for locating construction or other compounds on East Tilbury (Hazardous) Landfill Site should assess the risks associated with differential settlement of the heterogeneous wastes deposited, potential escapes of polluting leachates as a result of additional loading on the landfill surface reducing the porosity of the wastes and subsequent reduction in leachate storage capacity and possible presence of landfill gas.

S.2.18.15
All soils will need testing prior to determining appropriate storage provisions.

S.2.18.26
Temporary and permanent substations require appropriate design to preclude future pollution risks, especially in sensitive areas with regards to groundwater.

S.2.18.29
We would like to see details regarding the nature of the TBM slurry.

S.2.18.33
We would like to see detailed Hydrogeological Impact Assessments for all dewatering proposals which should include risks to groundwater levels and quality, along with monitoring proposals. This is particularly critical for the Northern portal where dewatering is proposed in the area of an historic hazardous waste landfill.

S.2.20.3
We would like to see any proposals for new fuel stations at the proposed Rest and Services area(s).

Section 11 - Geology and Soils
S.11.4.5
All site investigation data and reports should be provided for review.

S.11.4.30
It is imperative that Tilbury Main and its tributaries are protected from any adverse impacts caused by works around East Tilbury landfill.

S.11.4.39
Assessment of tidal influences on levels in the chalk aquifer should determine whether they are a result of direct hydraulic continuity or tidal loading. It is imperative that the works do not alter the current hydraulic regime between the Thames and the chalk aquifer.

S.11.4.89
Gorham's Farm is currently permitted for restoration rather than impermeable capping.

S.11.4.105
We would like to see the detailed desk study report that has been compiled concerning potential contamination issues.

S.11.4.127
We note that soils information has been compiled from existing sources; we would like to see ground investigation reports for soils within the study area.

S.11.4.145
We would like to see an assessment in the ES of whether any UXO pose potential land or groundwater contamination issues.

Table 11.11
Potential effects and mitigation measures for construction

- we would like the ES to provide ground investigation data and interpretation regarding sink holes and the potential impacts of the works on the quality of

surface and groundwaters and any impacts on abstractions and designated ecological sites.

- we would also like to see the proposals for piling designs.
- full consideration of dewatering impacts on water quality and local abstractions and surface and groundwater is required.
- with respect to East Tilbury Landfill Site, any intrusive investigation should not penetrate confining geological barriers and create pathways for landfill contaminants to enter groundwater. If it is necessary to investigate groundwater or geological strata beneath the landfill site, drilling techniques suitable to maintain the integrity of the geological barriers and prevent the creation pathways to groundwater should be agreed with the Environment Agency.

<u>Section 15 – Road Drainage and the Water Environment</u>

S.15.3.3 and 4

The required water features survey (WFS) area will depend on the exact dewatering proposals; the exact WFS area for the northern portal is still to be finalised with the Environment Agency.

Table 15.7

It cannot necessarily be assumed the alluvium and tidal flats deposits effectively confine the chalk in all areas north of the Thames; this requires detailed assessment.

S.15.4.30

There are relatively few groundwater monitoring locations in the area north of the Thames; site specific monitoring data from nested piezometers will be required to inform the hydrogeological regime at key sites, especially in the area which may be affected by dewatering.

S.15.4.33 and 4

The assessment of aquifer vulnerability needs to consider areas if the chalk north of the Thames that are not covered by low permeability alluvium or London Clay; careful consideration of the degree of protection that is afforded to the chalk by the alluvium is required.

S.15.5.3

We would like to see the Hydrogeological Risk Assessment as soon as it has been completed please.

S.15.5.8 and 9

We agree with the listed aims of ground investigation and groundwater levels and quality works but would also like these to include reference to groundwater quality and in particular, north of the Thames, the potential issues with the historical landfill at East Tilbury Marshes.

Table 15.11

Potential construction effects and mitigation north of the Thames. This table should consider the potential for impacts on Mucking Flats and Marshes SSSI to the east of

the northern portal site; the sections on groundwater resources, the South Essex Chalk and the Linford public water supply abstraction should also include the potential for mobilisation of contamination due to dewatering near the historical landfill site.

LTC#2 - PEIR Volume 2

Water Features Survey. Site visits are required for all sites within the finalised WFS area; a detailed Hydrogeological Risk Assessment for Dewatering (to cover pump testing and construction) will be required before the WFS area can be set.

Figures Volume 3a
Figure 2.2b
Shows an area of landscaped excavated material on the southern half of East Tilbury Landfill Site. Any such proposals must assess the impact of the additional loading on the landfill and potential emissions. If landscaping leads to increased surface water run-off, the Environment Agency should be consulted with regards to the ability of the existing drainage channels and sluices to cope with this extra volume of water.

We do not currently have sufficient detail on the proposals or the site area; this will hopefully be addressed by ground investigations and the Environmental Statement.

Biodiversity

Marine

We have assessed LTCs Preliminary Environmental Information Report (PEIR) consultation documents and are satisfied with their content in terms of marine water quality.

The main impacts on marine water quality from the proposals relate to the potential need for a new jetty or similar infrastructure in the River Thames (or there might be potential to reuse an existing jetty) to transport excavated tunnel material. In the longer term it may be that scour protection is needed in the riverbed (to maintain its stability) which is likely to take the form of either rock dumping or using mattress type solutions to cover the tunnel section. The need for scour protection and impact of other river-based construction activities will be further assessed in consultation with relevant statutory bodies.

We note that potential mitigation for impacts from the jetty includes “Jetty design which limits the number of piles and requirement for dredging where practicable. Where possible, use of soft start and vibro-piling techniques to limit extent and duration of noise emissions. Best practice methods for dredging operations.”

LTC is aware that a full Water Framework Directive (WFD) Assessment of the proposals will be required in due course and we note that (Section 15.5.10) “The

findings from all the above surveys and assessments will be used to inform a stand-alone Water Framework Directive Compliance Assessment, which is being scoped in consultation with the Environment Agency."

Terrestrial ecology
The PEIR states that the drainage strategy in relation to the southern side of the Thames is still be determined. Surveys are being carried out on the Ramsar to establish risks associated with the final proposed drainage plan.

It is noted that the plans retain in them a potential drainage route on the western end of the Ramsar/SSSI and this could therefore have a significant impact on the site. Ecological surveys of the area, as well as a full ecohydrological understanding of how this part of the Ramsar works will be required in order for us to determine the likely impacts of any proposed drainage routes. We therefore cannot determine at this stage whether this is an acceptable choice without the completion of surveys and designs.

It is noted that green bridges are proposed along parts of the Southern road. It must be determined that these are of sufficient size and design to function for all mammal species that currently utilise the area, as well as providing the necessary corridors for the movement of other species. The design should use contemporary evidence to establish minimum sizes and locations.

Volume 1, Chapter 9 Terrestrial Ecology
Page 261
It appears that the Essex Field Club, a major source of wildlife records, has not been consulted. They hold millions of records, many not held by the Essex Wildlife Trust Biological Records Centre.

Page 274
It is highly likely that slender hare's-ear and sea barley are found on the sea wall flood defences.

Page 278
There is a large population of eels in the main Mardyke channel. This needs highlighting.

Page 289
The importance of Tilbury Fort for wildfowl means that measures should be put in place to prevent their disturbance during and after construction.

Page 302
Given the prevalence of water voles in the development area, serious consideration must be given to avoidance, mitigation and compensation measures.

Page 303
There is a reference to two desk-based reports of otters. Given the quality of habitat along the main Mardyke channel, we believe that mammal ledges should be installed along any road culverts.
Page 305
Gap-filling surveys are important and should be undertaken as prescribed. We are particularly interested in the otter and water vole surveys.

Page 307
There is a lack of information on the impacts on fish (particularly eels) during construction and operation of the new road. Also what are the impacts on the Water Framework Directive potential of the Mardyke main channel and tribs.

Chapter 15. Road Drainage and Water Environment
Page 517
The culverting/pollution for Tilbury Main and Orsett Fen need significant offsetting as does the diversion channels. There must be no barriers to eel passage and enhancements where possible. This could include reprofiling to channel banks to benefit riparian wildlife and creation of fish refuges for eels. All bridges or significant culverts should include mammal ledges. Flood compensation and SuDs should be designed to form ecological features.

Clear span crossings are ideal although shading could be offset by channel enhancements downstream and upstream.

All new culverts should be accompanied with the creation of new river/stream habitat at a scale of at least 1:1. Where possible recreated habitats should be of higher quality than those lost to the scheme.

Environmental protection and waste

General comments

The applicant will need to identify where permissions such as environmental permits and abstraction licences are required.

Environmental permit pre-application advice can be found at:
https://www.gov.uk/government/publications/environmental-permit-pre-application-advice-form
and
https://www.gov.uk/guidance/waste-environmental-permits#get-help-with-your-application

Abstraction licence pre-application guidance can be found at:
https://www.gov.uk/guidance/water-management-apply-for-a-water-abstraction-or-impoundment-licence

LTC#1 - PEIR Volume 1

Page 23 drainage
2.9.4
It is good to see that attenuation basins will be provided which will improve water quality.

2.9.5
We are pleased to see that facilities will be installed to capture and contain pollutants arising from spillages.

2.9.6
Groundwater sensitivity and groundwater source protection zones should also be taken into account when considering drainage options.

Page 28 tunnel design
2.14.6
Suitable disposal routes for contaminated water such as that arising from wash down and fire fighting activities needs to be identified. Will infiltration water be saline? If so, discharge routes need to be considered as freshwater receptors will not be suitable to receive this water.

Page 493 road drainage and water environment
15.2.1
Table 15.2.1 should be updated to include The Environmental Permitting (England and Wales) Regulations 2016. Under Reg. 38 (1) of EPR 2016, it is an offence for a person to operate a regulated facility (for example, a groundwater activity or water discharge activity), or cause/knowingly permit a groundwater/water discharge activity, without an environmental permit.

The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 should be considered.

Page 511 existing drainage
15.4.57 should also refer to Anglian Water Services Limited.

Page 514-524 effects and mitigation
Tilbury Main system (main rivers and ordinary watercourses) have been identified as a receptor for mobilised contaminated land leachates. Chalk and gravel aquifers and Linford public supply have not been identified as potential receptors for mobilised contaminated land leachates.

LTC# 13a-13f

LTC 13a sheet 9b identifies a rest and service access area at Tilbury junction. Foul water disposal arrangements will need to be considered. Suitably sized and designed oil separators will need to be included in the car park design.

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Annex C.2 Environment Agency Supplementary Consultation Response

creating a better place

Environment Agency

[redacted]

Our ref: KT/2018/124865/02-L01
Your ref: Lower Thames Crossing
Date: 02 April 2020

[redacted]

LOWER THAMES CROSSING SUPPLEMENTARY CONSULTATION

The comments provided in relation to this supplementary consultation build on the same comments we provided from the Preliminary Environmental Information Report. Due to limited information available, we are unable to provide detailed reviews of the information submitted to date. We continue to welcome further engagement from the Lower Thames Crossing project to provide early input to key documentation and advice on mitigation, compensation and methodology in preparation for Development Consent Order submission.

Flood risk

We note the changes to the route and associated works and have some further comments to make in addition to those made on the previous consultation. We are currently awaiting further details of the flood modelling, which we know is currently being prepared and look forward to providing detailed comments once this information is available.

Crossing of the River Mardyke and Orsett fen Sewer

The proposed road will cross the River Mardyke and the Orsett Fen Sewer. The document does not detail the proposed height of the viaduct at this location, although we expect to receive the detail once the modelling has been produced.

Compensatory storage

We acknowledge the areas proposed for compensatory storage in map book 2 and look forward to further discussion on these areas as the detailed modelling becomes available.

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Utilities update report
Any utility crossings such as temporary crossing (for construction for example), pedestrian bridge cycle ways, bridle ways requiring a permit should have modelling to support the application to show no increases in flood risk.

Environmental Mitigation Area at Coalhouse Fort
The proposed Environmental Mitigation Area immediately to the west of Coalhouse Fort is not fully protected against tidal inundation, and the defences only protect against tides up to a maximum of 20% AEP events. The defences protecting this site and presently damaged and repair is not guaranteed. We would be open to proposals from the applicant to address these issues.

Mardyke Viaduct
The movement south of the Mardyke Viaduct does not appear to have any significant impact of our activities for maintenance of the Mardyke or its tributaries verus the previous proposals. It is also noted that there is proposed permanent land acquisition for environmental mitigation at this location and along the River Mardyke as well as the Orsett Fenn and Golden Bridge Sewers. We would be open to proposals from the applicant to modify the channel profile of these watercourses to provide additional storage during times of high flows.

Bowaters sluice
The revised proposals do not seem to have any significant impact on this system compared to the previous proposals.

Section 7: Building the Lower Thames Crossing
In the section titled “ground preparation works” it mentions that “this construction activity would take place south of the river. It would start from a shaft located south of Lower Higham Road and travel to a shaft located north of the North Kent Railway Line.” It is unclear whether the Southern Shaft is within Flood Zone 1, however the Northern shaft will be located in Flood Zone 3. These works should be detailed within the Flood Risk Assessment and the flood risk and potential impacts appropriately assessed and mitigated.

The Northern element of these works are close to the main river, Shorne and Higham Marshes. We would want to understand the setback of these works from the river as the detail regarding this has not currently been provided. We would advise you that a Flood Risk Activity Permit may be required under the Environmental Permitting (England and Wales) Regulations 2016 if you want to do work:

- Within 8m of the bank of a main river, or 16m if it is a tidal main river
- Within 8m of any flood defence structure or culvert on a main river, or 16m on a tidal main river

Fisheries, Biodiversity and geomorphology

Terrestrial

The information provided is inadequate for us to comment on, as it fails to include sufficient technical detail on potential environmental impacts. Therefore we cannot provide any feedback on this consultation.

Marine

Section 4 of the report, Lower Thames Crossing Environmental Impacts Update 2020, confirms that changes to the marine works comprise only minor changes. These are to the development boundary to allow flexibility for the location where water will be discharged into the Thames (this would be excess groundwater removed from the construction or operation).

Therefore no significant changes to water quality are expected and effects will be no worse than reported in the PIER for either (i) construction of the temporary jetty or (ii) discharge of operational effluent via the outfall (which will be consented by the EA and controlled to minimise effects on Thames water quality).

Groundwater and contaminated land (inc permits)

Waste and materials

The changes highlighted in the Supplementary Consolation seem to have a negligible effect on the assessment on materials and waste presented in the PEIR. Even with Chalk Park (page 21) where additional landscaping is proposed as replacement open space to the east of Gravesend and surrounding the southern tunnel entrance.

Our previous advice still stands, the applicant will need to identify where permissions such as environmental permits particularly in relation to waste recovery, treatment, transfer, storage and long term stockpiling and abstraction licences are required. As part of that process we would expect a materials management strategy and proposed reuse criteria based on ground investigation of expected material types and classification/suitability for reuse, site-specific chemical criteria for reuse of excavated materials, treatment proposals for remediation of excavated materials and any the waste management and disposal options which will subsequently feed into a materials management Plan.

Also any site where waste was discarded or disposed of as waste in the past (whether the site now holds a permit or not) remains waste until is it recovered or disposed of. This includes historic landfills and past exempt activities (para 9's and 19's). Excavation of materials from a non-permitted site (historic) is not in itself a waste activity but the subsequent storage, treatment disposal and recovery are.

In this situation CL:AIRE DoWCoP cannot be used as that only applies to the direct use of excavated material produced in the course of development and used at a development site. DoWCoP may still be used elsewhere but not for excavated

waste. Waste will need to be treated before it is sent to landfill. This will include any waste excavated from old sites, inert and/ or non-hazardous.

Water environment
From a groundwater protection view on the south side the proposed changes do not alter any of our original assessment of the PIER. As ground investigations continue and assessment of any discovered contamination is made, we will discuss any required remediation as part of on-going DCO assessments/requirements and the EIA reporting.

The proposal for Chalk Park will need early discussion with us on detailed materials management options and any required permitting arrangements or agreements on other frameworks for materials re-use/deposits.

Any fundamental changes to drainage design will also require additional detailed discussions

Previous comments made about concerns around landfill sites have been taken on board.

Environmental Impacts update (P133 - road drainage relating to Marine Works). Any discharge to the estuary may also require a water activity permit. In the document we should also be included as a consultation body.

The route has moved to the east of Chadwell St Mary and may now be closer to the Linford public water supply, possibly within a Source Protection Zone 1 (SPZ1). Section 15.4.43 of the PEIR stated the project did not cross SPZ1. We will need this to be clarified.

Please refer the project team to our approach to groundwater protection and highlight position C4 on page 11:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/692989/Envirnment-Agency-approach-to-groundwater-protection.pdf

Page 107 of the 'environmental impacts update' document identifies the Linford public water supply and states further assessment will be carried out. We would recommend that Essex and Suffolk Water are involved in this at an early stage.

The realignment route is adjacent to the Ockendon landfill; as such risks to controlled waters needs to be assessed. Intrusive site investigations in this area will need to be carried out according to the PIER prescriptions (such as safe drilling methods) and agreed with the Environment Agency.

The road in section 17 (the height of the LTC and North Road) has been lowered by two metres. As a result, North Road has also been lowered by two metres, resulting reported potential increase of groundwater seepage into the excavations. Risks to controlled waters needs to be assessed in terms of quality and quantity. Dewatering requirements and discharge need to be quantified and consented/permitted.

A watching brief needs to be adopted during construction to identify visual/olfactory evidence of gross contamination.

Yours sincerely

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Annex C.3 Environment Agency Design Refinement Consultation Response

creating a better place

[redacted]

Our ref: KT/2020/127273/01-L01
Your ref: Lower Thames Crossing

Date: 11 August 2020

[redacted]

DESIGN REFINEMENT CONSULTATION
LOWER THAMES CROSSING

Thank you for consulting us on the design refinements of this project before Development Consent Order submission.

Flood risk and assets

There are matters linked to the route of the proposed Highway that are being considered as part of ongoing consultations with the Highways Authority. We have recently provided comments on the further detail required regarding certain elements of the route design. Whilst we do not anticipate that these would lead to insurmountable issues, we await further detail in relation to elements of the design that will require flood risk activity permits (including methodologies for permanent and temporary works), and also relating to the overall tidal and fluvial flood risk modelling for the development area.

As acknowledged in recent discussions it is noted that for the purposes of efficiency the land behind the tidal defences at Coalhouse Fort is included within the proposal despite the present condition of the tidal defences there.

Settlement of proposed access road and landscaping feature at North Portal must be considered in order to ensure design levels can be achieved. Previous advice has indicated that substrata is near maximum loading capacity. Implications for maintenance of the River Mardyke in the area of the proposed environmental mitigation need to be discussed in greater detail.

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

We have the following minor comments to make on the submitted design consultation and look forward to receiving the detail in due course.

Map Book 1
Sheet 7a: The South Portal Discharge Options paper proposed to utilise an existing outfall as the preferred option whereas on the General Arrangement Plan (Sheet 7A) a new outfall looks to be proposed. Please confirm which approach is being taken so we can provide you with detailed advice.

Please be aware that a Flood Risk Activity Permit may be required.

Sheet 15. This plan shows the proposed locations on the Mardyke viaduct and the Orsett Fen viaduct. It also shows the embankments required to allow for construction of the road through this location. The embankments are located within the floodplain of the River Mardyke and its tributaries, and must be included within the flood modelling supporting any future application.

Sheet 16c.
It should be noted that the red line boundary for the utility works at this location cross a designated main river, known as 'Tributary to Stringcock Sewer'. A Flood Risk Activity Permit may therefore be required for works within 8 metres of the river.

Sheet 19.
North-west of North Ockendon flows a Main River known as West Branch Mardyke. A flood risk activity permit may therefore be required for works within 8 metres of the river and further information should be submitted regarding the crossing proposed here so that the proposals can be considered further.

Map Book 2
Sheet 6
The main works construction compound starts adjacent to Lower Higham Road, although majority of this construction compound is within Flood Zone 1 a small section adjacent to Lower Higham Road is within Flood Zone 3. From the plan it looks to be that most of these works may be below ground but additional detail needs to be provided to confirm whether this is the case.

For any works proposed in Flood Zone 3 the flood risk and potential impacts relating to the works should be appropriately assessed and mitigated.

Sheet 7
This map shows that there is a main construction compound adjacent to the North Kent Railway and Thames Medway Canal. The Shorne and Higham Marshes main river flows through most of this compound area. A Flood Risk Activity Permit may therefore be required.

Please provide further detail about the works proposed in this location so more detailed advice can be given.

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

As this compound area is within Flood Zone 3 the flood risk and potential impacts will need to be appropriately assessed and mitigated. We do not have flood modelling for the Shorne and Higham Marshes main river/ditch network. Therefore, modelling will be required to assess the associated flood risk.

Environmental Impacts Update
We have no specific comments to make on this update report as it does not provide sufficient information for us to make a detailed response. We note that detailed measures will be repowered within the Environmental Statement, which will be submitted in due course.

Groundwater and contaminated land

We have no concerns from a groundwater impact perspective for the majority of the amendments to the Design Consultation. Most have been identified previously and mitigated for. The document appears to be in line with the agreed PIER for matter involving drainage, soils and materials management in the area to the South of the River Thames.

Section 24 New water supply from the Linford borehole and a local water main and Section 25 Potential upgrade of the existing water network.
We were wondering if the supply of water from Linford PWS been officially confirmed with Essex & Suffolk Water? The Water Framework Directive (WFD) status of the South Essex Thurrock Chalk has reduced to 'poor' for Cycle 3, as it has failed the Groundwater Balance Test. Linford PWS, has modelled at its licenced rate, is a contributing factor. We recognise also that in recent years the Linford abstraction has been underutilised. If not already established the water resource availability should be further discussed and confirmed with Essex & Suffolk Water and the Environment Agency.

Environmental pollution

There appears to be fairly minor changes from an environmental pollution point of view.

The document refers a lot to 'Operational effects are the same as those described in the PEIR' and 'Pollution risks during the construction phase are going to be managed through the CoCP and CEMP'. We look forward to receiving further information around these in the submission document.

Fisheries and biodiversity

19. Northern tunnel entrance layout
Loss in continuity of a watercourse, such as putting in a culvert, will affect the ecological aspects along the length of the waterbody and could reduce its Water Framework Directive status. We recognise that the length of this culvert has been

reduced by 20m, however it still will impact the movement of fish and invertebrate populations within this catchment.

As mentioned previously in this letter the land behind the tidal defences at Coalhouse Fort is included within the proposal. The viability of freshwater habitat creation is questionable at this location due to the current condition of the tidal defences. We look forward to working with you more in agreeing a solution for this habitat creation.

Yours sincerely

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Annex C.4 Environment Agency Community Impact Consultation Response

creating a better place

Environment Agency

[redacted]

Our ref: KT/2021/128817/01-L01
Your ref: Lower Thames Crossing

Date: 08 September 2021

[redacted]

COMMUNITY IMPACTS CONSULTATION

LOWER THAMES CROSSING

Thank you for consulting us on the additional and updated information for the Lower Thames Crossing (LTC).

The Environment Agency has an agreement in place to provide pre-application advice and have been working with LTC throughout the project. Comments on specific documents are being made directly to LTC through this service as well as our permit pre-application advice service.

We request that there is a timely flow of information between LTC and the environment agency to ensure we are able to provide the required advice.

We would like to highlight some of the work we have done together to improve the scheme for the environment.

- Moving the southern tunnel entrance 600 metres south, reducing the interaction with groundwater bodies in the area
- Initially moving the location of the proposed Rest and Service area from the closed East Tilbury Landfill to further north
- Removing East Tilbury Landfill from the red line boundary area
- Changing the scheme design from an earth embankment to viaducts through the Mardyke Valley to reduce the impact of the project on flood risk and the river environment
- Increasing the proposed viaduct lengths by 50 metres to reduce impact to the flood risk and reduce environmental impact to the river environments

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

- Altering the route of the road around Ockenden Landfill to reduce potential environmental impacts

- Removing of the proposed Rest and Service area, reducing impact on the environment and flood risk

- Finding a suitable, long term site for freshwater habitat creation which will benefit the local area

- Improving the flood protection around the northern tunnel entrance including allowance for increased defence levels in accordance the Environment Agency Thames Estuary 2100 plan

- Reviewing Groundwater Investigations around the proposed location of the southern portal to ensure that ground water flow and dependencies were understood

- Reviewing Ground Investigations around the northern portal location to ensure that groundwater flow and dependences to public water supply are understood as well as the interaction with the local landfill sites

- Reviewing Ground Investigations along the route to assess the impact of the proposed cuttings on the flow of groundwater, local abstractions, and water dependent sites

- Increasing the number of green bridges in the scheme to maintain the connectivity of wildlife between habitats

- Moving of compound locations out of environmentally sensitive areas

Securing Biodiversity Net Gain for the projectWe continue to work with LTC on various aspects of the scheme in preparation for their Development Consent Order submission. We hope this working arrangement will continue after examination, throughout the construction phase of the scheme and into the Legacy work.

Yours sincerely

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Annex C.5 Environment Agency Local Refinement Consultation Response

From: [redacted]
Sent:
To:
Subject: FW: Local Refinement Consultation response from EA
Attachments: 20220617 EA refinement con response.pdf

[redacted]

Sent: 17 June 2022 10:36

[redacted]

Subject: Local Refinement Consultation response from EA

Please find attached the response for the Local Refinement Consultation from the Environment Agency.

Kind regards

[redacted]

If you're planning a new development, we want to work with you to make the process as smooth as possible. We offer a bespoke advice service where you will be assigned a project manager who be a single point of contact for you at the EA. This early engagement can significantly reduce uncertainty and delays to your project. More information can be found on our website here.

Please note – Our hourly charge is now £100 per hour plus VAT.

Office 501, 31-35 Kirby Street, London EC1N 8TE
www.traverse.ltd

creating a better place

Environment Agency

[redacted]

Our ref: KT/2022/129762/01-L01

Date: 17 June 2022

[redacted]

LOWER THAMES CROSSING: LOCAL REFINEMENT CONSULTATION

Thank you for inviting us to comment on the Local Refinement Consultation for the Lower Thames Crossing.

As you are aware, the Environment Agency has an agreement in place to provide pre-application advice and have been working with LTC throughout the project. Comments on specific documents and themes are being made directly to LTC through this service as well as our permit pre-application advice service.

We have been working with LTC to protect the environment since the preferred option was chosen. We continue to provide advice and guidance on key elements such as flood protection, water quality, groundwater resources and protection, waste management and permitting.

We request that there is a timely flow of information between LTC and the environment agency to ensure we are able to provide the required advice.

We are still working with LTC on various aspects of the scheme in preparation for their DCO submission. We hope this working arrangement will continue after examination and throughout the construction phase of the scheme as well as with the Legacy work.

Yours sincerely

[redacted]

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Annex C.6 Tilbury Main Diversion Options, Choosing By Advantage Light (HE540039-CJV-GEN-GEN-MIN-DCO-00002)

Stakeholder Meeting Minutes Lower Thames Crossing

Tilbury Main Diversion Options CBA 'Lite'

Date: 16 December 2019

Location: LTC Office, Beaufort House, Aldgate, London

Ref: HE540039-CJV-GEN-GEN-MIN-DCO-00002

Attendees:

Name	Initials	Organisation
[redacted]		

Meeting notes:

Purpose of meeting
For LTC to present the various options for the Tilbury Main River where it crosses the route and to discuss the assessment and decision-making, to see if a preferred solution can be agreed and to mutually acknowledge the assessment outcome.

Actions:

New Action	Owner	Para Ref
1. [redacted]	[redacted]	3.2.3

Discussion points

1. Tilbury Main Diversion Options and Assessment

1.1 **Presentation of options and assessment** were introduced by AK and NP (see presentation for details) comprising:

- 1.1.1 Shorter culvert – 65m shortest combined corridor is the most practical option;
- 1.1.2 Divided river;
- 1.1.3 Longer culvert – 550m;
- 1.1.4 Open channel;
- 1.1.5 Pumping.

1.2 **Simplified Choosing By Advantage (CBA) chart** introduced by AK, representing advantages of each option in green notes, as taken from LTC's 'Options Crossing for Tilbury Main' report (ref. HE540039-CJV-EFR-GEN-TNT-00004 V2.0); pink notes indicate the challenges / key disadvantages of each option over the following topics.

1.3 **Hydromorphology:**

- 1.3.1 Short culvert:
  - 1.3.1.1 MA highlighted the key dimensions of the culvert; there is an existing pipe which is currently a constraint for flow – this larger diameter box culvert offers better flow.
  - 1.3.1.2 The culvert would include a mammal ledge.
  - 1.3.1.3 Hydraulic modelling will be undertaken to allow for climate change / flooding.
  - 1.3.1.4 Proposed box culvert provides betterment compared to existing pipe in terms of hydraulics.
  - 1.3.1.5 Shows the least impact in CBA analysis.
- 1.3.2 Divided river:
  - 1.3.2.1 Disrupts existing hydromorphology.
  - 1.3.2.2 Impacts performance due to the increased length of the channel resulting in slower flow due to lower gradient. This may also increase siltation.
- 1.3.3 Long culvert:
  - 1.3.3.1 Too long to be practical.
  - 1.3.3.2 Length / gradient reduces hydraulic performance.
- 1.3.4 Open channel:
  - 1.3.4.1 1km diversion to the south (Tilbury Main) is significant.
  - 1.3.4.2 Gradient likely to be reduced therefore reducing hydraulic performance of Tilbury Main. This may also increase siltation.
- 1.3.5 Pumped:
  - 1.3.5.1 Fully dependent on mechanical solution.
  - 1.3.5.2 creates complete break in the river.

1.4 **Topography**: Presented by NP with details regarding the landfill, overview of the topography, drainage ditches (ordinary watercourses). Historic landfills throughout the area. Any options that require works in Goshems landfill – require a very wide channel with approx. 20-degree side slopes, therefore an enormous volume of landfill excavation and redeposition. AK pointed out that no advantages have been identified for the longer culvert or an open channel going through Goshems landfill.

- 1.4.1 Short Culvert – some foundations required; groundworks required.

1.4.2 Divided river – neutral as taken outside of landfill to the west.
1.4.3 Long culvert:
1.4.3.1 Foundations required;
1.4.3.2 Complications with tunnel portal structure – heavy engineering required.
1.4.4 Open channel:
1.4.4.1 Natural but geotechnically very challenging;
1.4.4.2 Very shallow side slopes would be required on deep excavations through the landfill.
1.4.5 Pumped – foundation work required.

1.5 **Geotech and contaminated land:**
1.5.1 Leachate issue: the long culvert or open channel would need construction / works would be below the level that leachate would leak out of the landfill – both of these options would require the opening of landfill to get the structures built.
1.5.2 Tunnel engineering complexity – longer culvert linking in with portal; longer culvert piled foundations that could impact on the structure of the portal.
1.5.3 The pumped solution and short culvert are likely to require piled foundations. Foundations would be less significant for the pumped solution.

1.6 **Ecology (NC):**
1.6.1 Short Culvert:
1.6.1.1 Acknowledged that a short culvert is not the preferred choice from an ecological perspective and that there are not many natural ecological advantages.
1.6.1.2 Design replicates exiting channel in terms of hydraulics, depth and flow to facilitate eel passage and invertebrate passage. No impact on eel passage is likely.
1.6.1.3 Base of the culvert to be sufficiently low in order to allow a natural bed to be created.
1.6.1.4 Water Voles (NC): acknowledged that any culvert is detrimental for water voles due to the significant risk of habitat fragmentation. With the proposed design including mammal ledges and appropriate headroom, the short culvert could maintain some connectivity east and west. However, there is no precedent for this so fragmentation seems likely.
1.6.1.5 NP commented that some natural curvature would be added into the culvert so it is not a straight line. It would be built offline and then the river would be diverted into it.
1.6.2 Divided river:
1.6.2.1 No ecological advantages due to fragmentation of habitat.
1.6.2.2 The additional length of the river could be colonised by water voles but the issue of fragmentation outweighs the additional length of open water course that could be achieved.
1.6.2.3 The divided river solution would have a slow discharge rate, which is a key consideration for siltation and the impact on species (MR).
1.6.3 Long culvert:
1.6.3.1 Eels and water voles negatively impacted; vole population will be fragmented because it would be too long for the voles to use. No ecological advantages.
1.6.3.2 As per the short culvert, it would be built offline and watercourse diverted into it.

1.6.4 Open channel:
- 1.6.4.1 Neutral impact for eels;
- 1.6.4.2 Would naturally be a preferred option from an ecological perspective. However, the risk of mobilizing contaminants / leachate from the underlying landfill is a significant risk – this would affect the vole population.
- 1.6.4.3 Owing to underlying landfill would be a significant risk of leachate contaminating water and therefore affecting habitat / animal populations.
- 1.6.4.4 Would require removing large volumes of spoil prior to building the structure – opening the landfill, which is high risk from a contamination perspective.

1.6.5 Pumped:
- 1.6.5.1 Ecologically no advantages.
- 1.6.5.2 Would totally prevent passage of eels and other fish species.

1.7 JH – queried drainage ditch close to the river that will be cut off by the road – what is the interaction between the drainage ditch and the river? NP – doesn't think there is any interaction – the ditch is an artefact of groundwater levels and can dry out; it is not viable from a fish population perspective.

1.8 JH – queried if the channel would be steep sided as it could present issues regarding shading in the channel. AK – unlikely to be an issue; channel cannot be steep sided due to the engineering challenges.

1.9 **Construction**:
- 1.9.1 Temporary diversion of the main river would be required for all options (NP).
- 1.9.2 Query regarding culvert maintenance – would be Highways England's responsibility (AK). The culvert options would be self-cleaning, although this likely to be more effective with the shorter culvert.
- 1.9.3 Pumps would require significant mechanical and electrical maintenance. They are a potentially higher risk option in the instance of them failing in a flood scenario.

2. Discussion of Advantages and Disadvantages

2.1 TB considers an assumption is being made regarding the passability of water voles and other ecological receptors. TB feels that there is an evidence gap in proving that a 65m culvert is passable and suspects the culvert will disconnect the habitats on either side of the road.

2.2 TB also considers that there is an evidence gap regarding the length of culvert that is acceptable for various ecological receptors.

2.3 NC response – LTC has acknowledged that there is the downside of fragmentation through use of a short culvert, but there are the least number of disadvantages and the least negative impacts, compared to the alternatives, from a broader planning perspective. 65m is potentially passable, whereas 500m is not.

2.4 TB queried if it was an assumption to say that a short culvert is any different ecologically compared to a long culvert – discussion followed regarding the

advantages and disadvantages identified for the long vs short culvert (as detailed above in discussion point 1).

2.5 TB stated that on the basis of the discussion he would concur that the short culvert is better in principal.

2.6 AK – queried if the EA had any further recommendations for design of culvert to improve it. MR responded with detail from LTC as within the limitations of a culvert design LTC is trying to provide the best possible solution from an ecological perspective, including the following:

- 2.6.1 It is good practice to sink culverts low enough to introduce natural material in the stream bed.
- 2.6.2 Baffles should be avoided from a debris and maintenance perspective.
- 2.6.3 The design will replicate the existing channel in terms of size and function – there is no change in hydraulics therefore no change in watercourse for eels and fish.
- 2.6.4 LTC acknowledge that culvert is dark for fish passage, but there is no evidence to suggest that darkness is an issue.
- 2.6.5 Within culvert will not get macrophyte growth but within the limitations of the design LTC is trying to find the best possible solution from an ecological perspective.

2.7 MR – for fish species and eels and in-channel short culvert is a suitable solution.

2.8 MR – the planning and construction complications of the open channel means that it is not a viable solution.

2.9 TB – queried whether a behavioural barrier could be presented for e.g. water voles due to lack of vegetation, to hinder species from passing through culvert.

2.10 TB – none of the options avoid fragmenting the water vole habitat. Concerned that under the Water Framework Directive (WFD) the potential for deterioration [due to fragmentation] would require consideration.

2.11 MR – queried which elements of WFD would be most impacted by the short culvert proposal. TB response: eels, macrophytes; fragmentation and disconnection; consideration of impact on the entire downstream ecology or indeed upstream ecology.

2.12 KG asked for clarification regarding perceived issues upstream ecology issues:

- 2.12.1 TB (EA): Eels; coarse fish such as bream and roach may migrate within this catchment (these species migrate upstream to spawn).
- 2.12.2 Response from MR (LTC) – the catchment area is not ‘spectacular’ since the water courses are essentially field drains and there is not much diversity within the field channel. Culvert design is key to minimise any negative impacts on communities. Beyond eels, other species are minor. As previously mentioned, the culvert design will address water depth and water flows to mimic hydraulics upstream and downstream. May need to accept potential impacts and offset elsewhere in the scheme.
- 2.12.3 Noted that LTC has not surveyed the channel for fish species – based on the physical characteristics of the channel, LTC can assume that eels and minor fish species are present.

2.12.4 NC – it should be noted that the CBA light approach doesn't take account of the ability to offset the impacts of each approach.

2.12.5 TB – connectivity of the landscape / habitat is the key issue. Does not think it has been fully represented in CBA diagram – AK countered this point reflecting that the diagram does indicate that the vole habitat is split.

2.12.6 TB – do otters use the catchment and if so how would LTC prevent road fatalities?

2.12.6.1 NC – can address concerns about e.g. crossing roads with fencing. Confirmed that there is no firm evidence to indicate that animals would use a culvert of this length. Best practice guidance says 30-35m max. Beyond that information it is acknowledged that we can't rely on the culvert as a robust mitigation approach.

2.13 TB – made reference to other sites that have presented alternative options to the culverting / the options presented by LTC.

2.13.1 KG requested examples / if there were opportunities that the EA could provide regarding such sites to facilitate learning from experience.

2.13.2 TB cited EDF site that has used an open span bridge.

2.13.3 KG asked the LTC project team to respond on the potential for using / complications of using an open span bridge:

2.13.3.1 Constraints for open span – has the potential for a more naturalised bed but will be the same width or slightly narrower.

2.13.3.2 Open span would be constrained in terms of elevation because of the proximity to the portal. Currently 3% gradient coming out of the portal – if the gradient was increased it would lead to higher CO_2 emissions (therefore decreased air quality and increased carbon footprint), as well as safety risks due to slowing HGVs.

2.13.3.3 In addition, an open span bridge would create the need to take a viaduct over station road and the Tilbury loop line. From a planning perspective, the project is trying to mitigate visual impact of road by keeping the viaduct lower.

2.13.3.4 JH – what percentage incline would we need to increase to, to accommodate an open span bridge?

2.13.3.5 NP – probably 4%. Other factors to consider – open span also requires increased maintenance and inspection whereas the culvert doesn't. This would require operatives to get to the underside of the bridge to inspect it, over a water feature – significant safety risk moving forward.

2.13.3.6 AK – further point to note is that an open span bridge would end up being very similar to a culvert due to the length and depth (very shallow) so would not provide increased ecological value.

2.13.3.7 NP – the bridge option would also be less in keeping with the overall reinstatement of the embankment and engineered fill / green embankment – would instead need to be concrete flood protection walls 3.5m above road level at that point and side road sat up at 7.6m therefore would take up more land.

2.13.3.8 AK queried if an open span structure with these constraints would allow vole passage, given that it would be at least 40m long and need to allow for structural abutments. Vole passage considered as challenged as short culvert.

2.13.4 TB – clear from the discussion that open span is not a viable alternative to the proposed options.

2.14 PF – should it be assumed that a culvert can't have a natural bottom due to contaminated land?

2.14.1 MR response – the culvert would fill with natural material by being set lower.

2.15 PF – could there be light holes along the length of the culvert e.g. in the central reservation?

2.15.1 NP – very difficult to implement light holes e.g. in central reservation of road need to make sure they're not leaking / flood water could rise through the centre and then flood the tunnel (huge safety risk). Would need to surround the light holes by a 3.5m concrete wall to mitigate flood risk so would form a dark shaft.

3. Conclusions

3.1 **LTC Closing comments**:

3.1.1 Short culvert presents the best overall option from a planning perspective.

3.1.2 As discussed, none of the other options presented in the CBA 'lite' present a significant benefit over and above the short culvert option, including open span bridge.

3.1.3 NC – planning balance is required. On assessment of all available options, it is acknowledged that there are detrimental effects with the short culvert but overall it is the most practicable option. Need to agree that this is the best option overall, although not ideal ecologically and reflect that in the statement of common ground.

3.1.4 NC – currently focussed on downsides and not focussed on compensation – require a licence from Natural England but need to demonstrate conservation benefits to species in area. Currently discussing with Natural England and the Wildlife Trust. In addition, further work is being undertaken in parallel to this to make sure we are mitigating impacts across the area e.g. part of the ongoing work is to support wildlife trust with mink control (of benefit to the water vole population).

3.2 **EA Closing Comments**:

3.2.1 JH – question regarding overall impact that short culvert could have on the watercourse in relation to WFD.

3.2.2 Would like evidence that a 65m length culvert is reasonable given best practice guidance is 35m max.

3.2.3 JH – could be an issue to be recorded in the SoCG (LTC agreed).

3.2.4 Would benefit from a discussion with Lisa Driscoll (LTC Water Environment Lead) regarding the WFD aspect.

3.2.5 TB – moving forward with the culvert would be acceptable on the basis that any deterioration is confined within the current watercourse quality classification – therefore can proceed while being mindful that further discussion / confidence is required regarding WFH and potential ability for water vole migration along the length of the culvert. PF and JH in agreement.

3.2.6 JH – assess river system as a whole rather than looking at one specific species.

3.3 Acknowledged Assumptions:

3.3.1 Fish species have been assumed to be present on the basis of the structure of the catchment, experience gained along the Thames, Team 2100 data.

3.3.2 Highways England would maintain the culvert.

4. LTC Position
4.1 It is likely that the project will proceed with the short box culvert option, which is acknowledged to have detrimental impacts ecologically but is the better option from an overall planning perspective. 4.2 LTC will consult with the EA on the WFD to ensure full engagement, consideration and discussion regarding all relevant technical information, prior to formally mutually agreeing our positions for the SOCG. 4.3 LTC will record all relevant matters within the Statement of Common Ground.
5. EA Position
5.1 Understand LTC approach with short culvert. 5.2 Currently hold concerns regarding the WFD requirements. 5.3 Currently hold concerns regarding the length of the short culvert at 65m and viability for water vole passage in comparison to best practice recommended maximum length of 35m. 5.4 TB agreed that the short culvert presented the 'least worst' option.

Annex C.7 WFD Implications of Culverting Tilbury Main (HE540039-CJV-GEN-GEN-MIN-STK-00801)

Stakeholder Meeting Minutes Lower Thames Crossing

WFD Implications of Culverting Tilbury Main

Date: 13/01/20

Location: LTC Office, Beaufort House, Aldgate, London

Ref: HE540039-CJV-GEN-GEN-MIN-STK-00801

Attendees:

Name	Initials	Organisation
[redacted]		

Meeting notes:

Purpose of meeting
To discuss the likely WFD implications of culverting Tilbury Main.

Actions:

New Action	Owner	Para Ref
JH to send through comments from colleagues on Stage 3 WFD Assessment	JH	2.11

Discussion points
1. Introduction & Update
1.1 SI- A Choosing by Advantage (CBA) light session was held before Christmas to identify the likely advantages and disadvantages of each option including: - Shorter culvert – 65m narrowest combined corridor is the most practical option - Longer culvert – 550m - Divided river; - Open channel;

- Pumping.

1.2 SI- LTC's best option based on engineering, environmental impact and considering an overall planning perspective is the shorter culvert.

1.3 SI- LTC understand the EA's policy is against culverting, but in our meeting before Christmas the EA acknowledged that the shorter culvert option is the least-worst (acknowledging that WFD impacts were not discussed).

1.4 SI- the Second part of the meeting will cover the WFD stage 3 assessment.

2. WFD implications of culverting Tilbury Main

2.1 LD- Stages 1, 2 & 3 of the WFD assessment have been submitted to EA. Stage 4 is being drafted now and being informed by groundwater modelling assessments.

2.2 LD- We understand that some of the EA's the key concerns are around the effects on the biological quality element of the Tilbury Main.

2.3 LD- The physical, chemical and specific pollutant assessments are in accordance with DMRB guidance for the drainage catchment discharging into the Tilbury Main. The assessment has shown that we are compliant. This gives comfort that we won't be impacting those elements of the WFD status of the watercourse.

TB- this is acceptable. Our concerns primarily relate to the connectivity of the landscape – flora and fauna impacts are of more concern.

2.4 LD- What is the EA's position on the principal of improving and enhancing other reaches of the Tilbury Main or nearby watercourses to offset the impacts of culverting; for example, creating water vole habitat?

TB- water vole aren't technically a WFD target species as they are not one of the quality elements. Fish and eels are more important to WFD assessment than water voles.

LD- consideration of water vole would be higher level-impacts on general habitats.

TB- agree. Welcome that this is included. One of the components of the assessment will be the baseline condition. EA don't have any baseline data. What we need to understand is what is there, and what the impacts of the proposed impact may be i.e. will this cause a deterioration of the organisms there? Fish and eel are more important to the WFD assessment than water voles would be. Is 65m passable for fish and eel? This should be covered in the WFD assessment.

LD- is the principal of enhancing other reaches acceptable?

TB- The principal with the WFD assessment is one out, all out. Generally, don't talk about mitigation and compensation in relation to WFD. It is possible but it depends on the species present and if this effects their connectivity.

LD- focus is fish and eels. No strong baseline. Difficult to determine deterioration.

2.5 MR- We went out to site to verify if the desk-based information is right. Most of the channel would be overgrown during the summer with very little open water. During site visit there was lots of silt and the water was shallow. There were some crabs in the lower section which suggests that there may be connectivity through the flood defence. It's possible that eels may be

using the catchment (assuming that it doesn't dry out completely). It was very limited in terms of other species due to overgrown nature of the channel. 65m culvert has the potential to effect connectivity. In terms of connectivity of eels, this could be addressed by the design of the culvert. Limited in terms of fish species based on data collected to date and on site.
TB- will the proposal cause a deterioration? We need to understand what the culvert will impact upon.
MR- the purpose is to retain the connectivity wherever possible, but the length of the culvert is clearly an issue. If the hydraulics are right, it shouldn't prevent fish from moving through the culvert if the flows permit. The watercourse seems to be subject to fluctuating flows. Ephemeral nature identified during the summer period. There is little evidence to support that shading provided by the culvert will affect migration, particularly as most species migrate at night.

2.6 MR- The invertebrate community here is not diverse. Not sure if the culvert would lead to a deterioration of the communities. Due to the low flows, it has a ditch type community
TB- wouldn't expect to see assemblages assocatied with fluvial fresh water condition. What is the impact based on this baseline? Species may be resilient to change.
MR- the intention is to provide the assessment giving a view as to whether there would be a significant impact in status deterioration. There is no baseline.
TB- Even if there isn't a deterioration i.e. high→good, if there is a measurable and visible deterioration it still counts as a deterioration. WFD legislation does allow temporary impacts. In other projects this is anything less than 1 year.

2.7 JH- NE are license holders for water vole, have they been consulted?
NC- We are in discussion with Sean and Jonathan along with Amy Radford (protected species licensing officer). We are also working with Essex wildlife trust to look at a catchment wide approach. This includes a broader scale mitigation approach. This may include mink control, with the objective of releasing water voles into a catchment clear of mink.

2.8 LD- we need to make sure that the assessment provides a robust baseline and sets out the design philosophy of the culvert and how we are reducing impact where possible.

2.9 TB- although there is no obligation it would be good to see discussions around how to improve the status of the waterbody for WFD

2.10 KG- from an engineering and mitigation point of view and from an overall planning perspective the short culvert is the least impactful. We need to clearly demonstrate why this is the case. Hopefully EA can see why we are taking this position.
JH- concern from EA that the culvert will cause a deterioration to the watercourse.
KG- this is what the assessment will address the concerns on. We are working to address them.
TB- recognise that these aren't the highest quality watercourse. If the assessment determines that there is a deterioration, article 4.7 of the WFD may apply which states that even if deterioration will occur in some

locations, the project can still go ahead if it warrants the deterioration. This will need secretary of state sign off.

2.11 Key points from WFD discussion:

LD – ensure all assessments have a robust baseline.

LD – set out design philosophy.

TB – include any measurable impact (regardless of the quality of the starting point).

TB – potential to improve the status of the water body would be an excellent aspiration to have and consider as an outcome.

ACTION: JH to send through comments from colleagues on Stage 3 WFD Assessment.

3. Stage 3 WFD Assessment

3.1 LD- We are breaking down the development into different components of work, which waterbodies may be affected, and which elements may be affected. The stage 3 assessment will screen in and screen out elements for stage 4.

3.2 UP- Some minor comments based on the review to date. In table 1 in section 2.2.1 there is a demolition of an existing of existing petrol station. This could affect WFD water qualities and needs to be included in the assessment. Tables 3, 4 & 5 need to be linked back to tables 1 and 2 to make it more logical.

LD- the petrol station hasn't been included because the remediation works (to ensure there is no pollution risk) is being progressed ahead of the rest of the development.

JH- Jonathan Atkinson also asked for southern portal compound fuelling information to be included

3.3 TB- temporary works issue to be included. Assessment is well laid out and has gone through the appropriate stages. Everything included.

3.4 JH- need to include all watercourses including all non-WFD bodies.

TB- this is mainly applicable to the Tilbury Main. All waterbodies do need consideration, not just those on the catchment data explorer. Anything classified as main river needs consideration. LAs should be leading on WFD elements of the ordinary watercourses.

LD- Tilbury Main and first order tributaries of the Mardyke are included, along with the catchment in between.

TB- sounds proportionate.

3.5 JH- In terms of screened out components- ideally temporary impacts of 1 year rather than 3 years should be considered.

TB- The nature of the activity should be assessed ecologically to determine what is 'temporary'. What happens if temporary impacts coincide with a period of drought for example?

3.6 TC- The long-term impacts of the jetty has been screened out. Does the jetty require planning permission for long term use? It currently has temporary permission for a period of 5 years.

MR- the current jetty that IVL use has permission on it. Plan is to seek a temporary extension. If this isn't possible, we would look to install another

one in the same location. This wouldn't be a permanent jetty. It will be assessed as a temporary structure. TB- The jetty was screened out as it was considered a like for like replacement. If it's a variation it needs to be included in the assessment TC- it may not be possible to get a like for like. MR- the intention is to replicate it in terms of piling and the desk structure. In terms of the location we are constrained with what we can construct. Not looking to construct a jetty to the deep-water channel for example. 3.7 TB- the assessment may need to be altered in the future. Can it be an active document if things do change in the project? LD- yes agree that it would be an active document as the project progresses. KG- please send any comments back to Kirstie on the minutes from the previous meeting by 24th January.
4. LTC Position
4.1 It is likely that the project will proceed with the short box culvert option, which is acknowledged to have detrimental impacts ecologically but is the better option from an overall planning perspective. 4.2 LTC will formally mutually agree positions with EA for the Statements of Common Ground.
5. EA Position
5.1 The EA understands LTC's approach with short culvert and agree that the short culvert is the 'least-worst' option. 5.2 They have concerns regarding the connectivity of the landscape in relation to flora and fauna impacts and the potential to cause a deterioration in WFD status (noting that the assessment should consider any measurable impact (regardless of the quality of the starting point)). 5.3 Improving the status of the water body would be an excellent aspiration to have and consider as an outcome.

Annex C.8 Coalhouse Point Mitigation Water Supply Structure (HE540039-LTC-EWE-S07-REP-ENV-00001)

Lower Thames Crossing

Coalhouse Point Mitigation Water Supply Structure

Document Number: HE540039-LTC-EWE-S07-REP-ENV-00001

Aims of the paper

- To confirm the assumed construction method for the installation of a self regulating tidal gate or equivalent structure at west of Coalhouse Point to secure a water supply for the HRA and ecology mitigation. Including:
    - Construction footprint
    - Operational footprint
    - Method of works
    - Timing of works
    - Design requirements
- Confirm Order Limit changes required for the additional structure

Introduction

LTC's proposed Habitats Regulations Assessment (HRA) and invertebrate mitigation at Coalhouse Point requires a secure water supply. Hydrology studies indicate there is insufficient water in the natural catchment to sustain the water demand. Plate 1 presents the location and indicative design of the proposed mitigation area in the context of the LTC alignment.

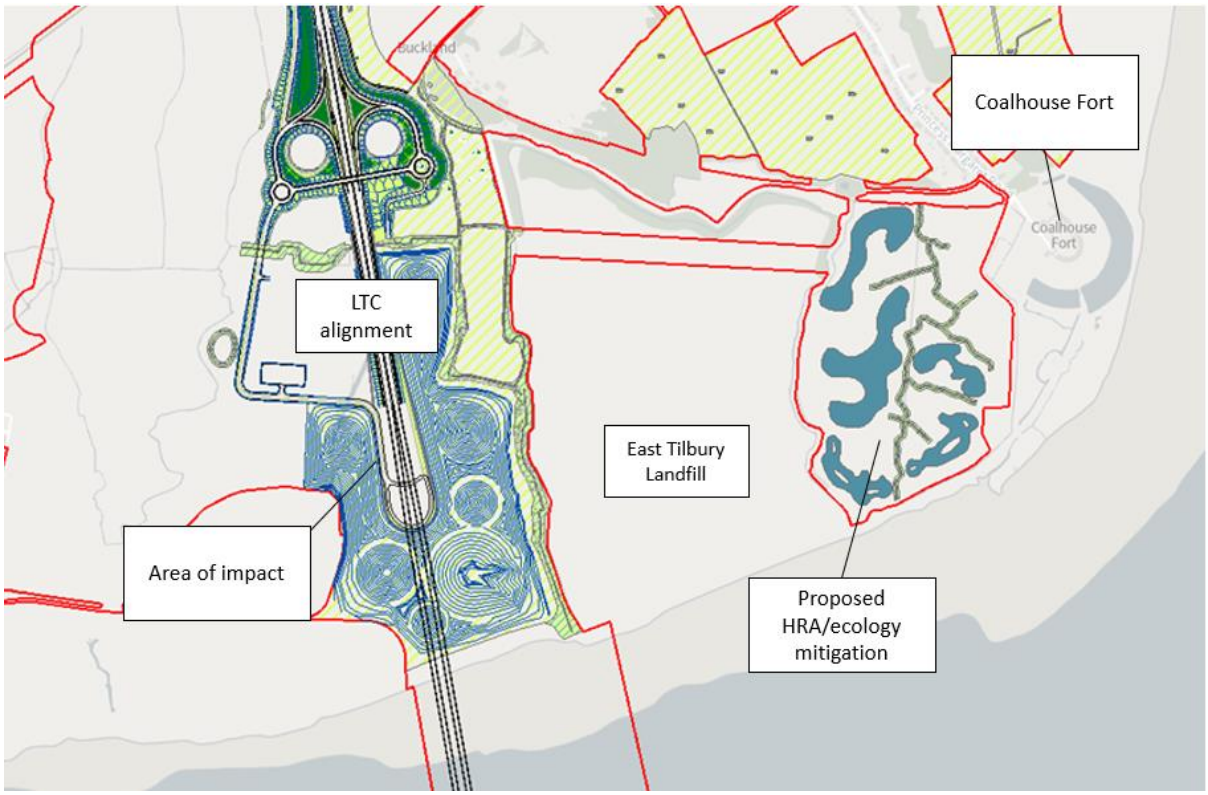


Plate 1: Proposed location of HRA and ecology mitigation

- The HRA and EIA require evidence that proposed mitigation is feasible. Natural England have advised that feasibility of the mitigation will need to be presented before they would be able to agree the sufficiency of the mitigation in the SoCG, which is a DCO acceptance risk and DCO consenting risk.

- A water supply solution is required by the HRA to demonstrate the feasibility of the measures in the DCO application, but also to inform engagement with Natural England in June/July 2022 so that the SoCG submitted at the application will have Natural England agreement on the conclusions of the HRA.
- Uncertainty on long-term condition and ownership of Coalhouse Point flood defences is an ongoing issue, however, does not influence the requirement of demonstrating the feasibility of a self regulating tidal gate or equivalent structure.

A choose by advantage workshop was carried out by the LTC Project team to achieve the following:

- Selection of preferred option/solution using Choosing by Advantage
- Identify next steps and risks
- Present update on a preferred option to DDG

The preferred option selected was to include provision for a structure to provide a direct supply from the River Thames within the DCO Order Limits and works plans. In parallel, the Project would seek to gain a legal agreement with Thurrock to supply water from the existing infrastructure within the Coalhouse Fort moat, however, this cannot be relied upon within the timescales required for the HRA consultation or DCO submission.

A review of alternative sites for the HRA and ecology mitigation has been carried out. No alternatives were identified.

The commitments in the HRA to include this structure reads:

HR010 – The habitat creation at the land adjacent to Coalhouse Point, indicated on the Environmental Masterplan (Figure 2.4, Application Document 6.2) and described in Clause S9.13 of the Design Principles (Application Document 7.5) will be carried out prior to the commencement of works at the Northern tunnel entrance compound. The water required to maintain a range of depths within the habitat consistent with the guidance in “Manage lowland wet grassland for birds” (DEFRA 2021) will be secured prior to completion of the habitat creation works and will, unless otherwise agreed with the Secretary of State, be sourced from the River Thames via a self-regulating tide gate or equivalent structure, passable by eels, constructed (in accordance with HR011) in the sea wall, at approximately TQ686761, to allow regulated tidal exchange (Work No. [TBC]).
HR011 –Works to construct a self-regulating tide gate or equivalent structure (HR010 Option 2) would be undertaken with the following constraints:

- In line with best practice, the works to construct the self regulating tidal gate or equivalent structure should be programmed for April – August (to avoid disturbance to passage and overwintering birds associated with European designated sites) where this would not delay the completion of the habitat creation works at the earliest date.
- All works requiring access to the inter-tidal zone would be completed to suit tidal cycle and at periods of low water.
- All piling works would be completed during periods of low water to avoid transmission of underwater noise.
- All piling works would utilise soft start piling and other best practice techniques, as per the JNCC 2010 guidance (Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise), to help avoid noise and vibration impacts.
- Excavated arisings would be retained within the coffer dam or stored on a support barge.
- No tracking on the upper foreshore area would be carried out.

Change to the Order Limits

To include provision of a new structure within the existing flood defence at Coalhouse Point, an amendment to the Order Limits would be required.

The location of the proposed structure, noted on Plate 2, has been determined by the following constraints:

- 50m offset from the western buried high pressure gas pipeline that crosses beneath the River Thames and the flood defence before taking an easterly alignment towards the National Grid AGI.
- An area which minimises the temporary disturbance of intertidal / mudflat habitat between the flood defence and mean high water level.
- Maintaining a distance of 100m from the boundary of East Tilbury Landfill.

To allow for the construction of the new structure, a temporary working area of 50m (longitudinally to the flood defence) by 20m to 35m (extending into the Thames) would be required. This would allow sufficient space during construction. This is presented as the orange area in Plate 2. The construction works would result in the temporary loss of inter-tidal habitat, however, given the scale of the proposed works and the dynamic nature of the tidal regime, any loss would naturally re-establish within a short-term timescale.

Once operational, it is assumed that the footprint of the proposed structure would not extend beyond the existing footprint of the flood bund and therefore the Project would not result in any permanent loss of inter-tidal habitat.

It was proposed to amend the Order Limits to incorporate the existing flood defence that is currently owned by the landowner, Mr Mott. This change was proposed irrespective of the requirement of a structure and is show as the red area in Plate 2. Given the new structure would be limited to the footprint of the flood defence, this change would also incorporate the new structure.

Plate 2: Proposed amendments to the DCO Order Limits to provide the 50mx20-35m working space for the construction of the sluice structure. Approximate amendments to Order Limits to incorporate flood defence also highlighted.

Key commitments/constraints to works

The works to construct the structure would be required in the early part of the construction programme. The HRA mitigation will need to be established prior to the northern tunnel entrance construction compound.

Works will be delivered in line with the constrains set out below.

- In line with best practice, the works to construct the self-regulating tidal gate or equivalent structure should be programmed for April – August (to minimise disturbance to birds) where this would not delay the completion of the habitat creation works at the earliest date (HR011).
- All works requiring access to the inter-tidal zone would be completed to suit tidal cycle and at periods of low water (HR011).
- All piling works would be completed during periods of low water to avoid transmission of underwater noise (HR011).
- All piling works would utilise soft start piling and other best practice techniques, as per the JNCC guidance, to help avoid noise and vibration impacts (HR011).
- Excavated arisings would be retained within the coffer dam or stored on a support barge (HR011).
- No tracking on the upper foreshore area would be carried out (HR011).
- The proposed final structure arrangement would be passable by eel, potentially opening up the proposed mitigation as new eel habitat, in line with HR010.
- The new structure would include a self-regulating arrangement to ensure water levels entering the mitigation can be controlled and water ingress can be stopped when the desired level within the created ditches and scrapes is achieved.
- Water level control would be established at the exit of the HRA mitigation to control flows leaving the site.

Structure design assumptions

The existing ground levels and tidal regime has informed the potential location and size of the structure, relative to the existing flood bund. The crest of the flood bund sits at approximately 4.0m AoD, whilst its base on the river side is around 1.0m AoD. The existing ditch directly to the north of the flood defence is at 0.0m AoD. Plate 3 provides a cross section of the existing flood defence.

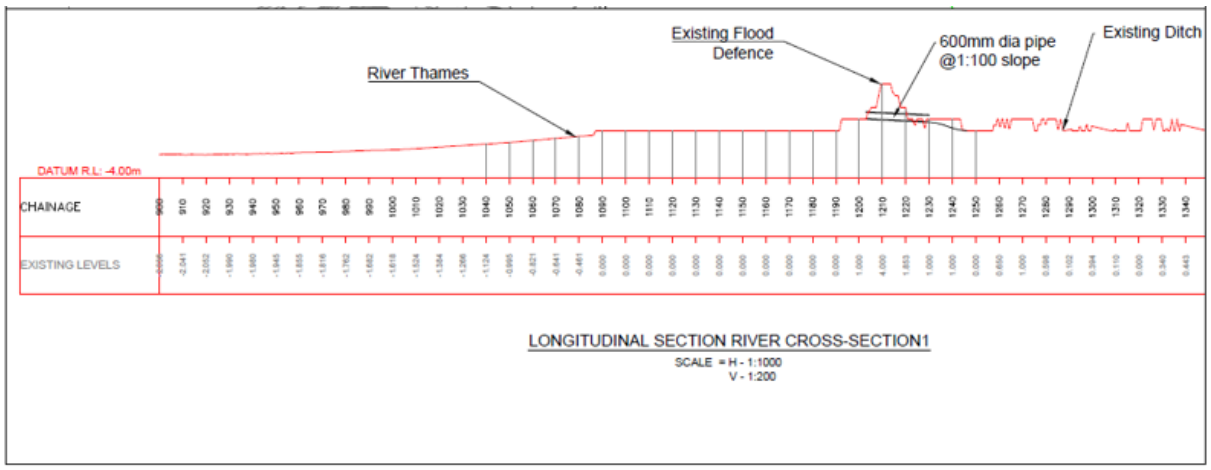


Plate 3: Cross section of the existing Coalhouse Point flood defence

An estimate of the Mean High Water Spring tidal cycle over a three-day period was developed using TE2100 model node at East Tilbury Marshes (Plate 4). It was determined

that the Thames' water level would be greater than 2.0m AoD for 24.75 hours over the three-day period. Assuming that a 600mm diameter pipe is installed, this would be sufficient to convey water through the flood defence to meet the required water demand of the proposed mitigation area and would avoid any permanent works within the inter-tidal area. Due to the elevated position of the structure within the flood defence and its relative position in terms of overall tidal frame, it has been assumed that the risk of the structure becoming silted up is low.

The final siting and form of the structure would be subject to detailed design.

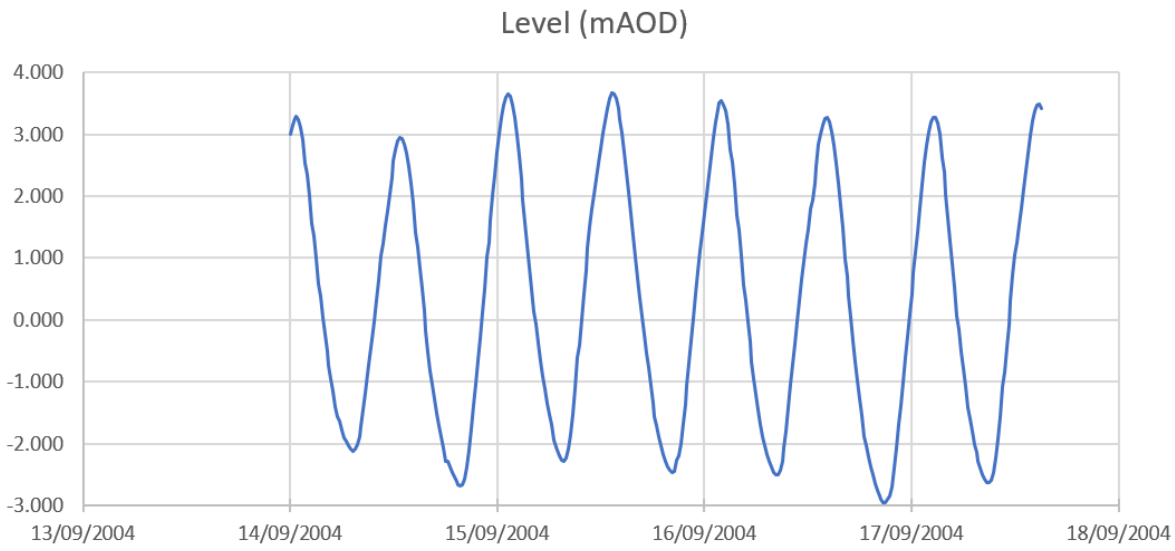


Plate 4: Mean high water spring tidal cycle at Coalhouse Point

To prevent unacceptable inundation of the land behind the flood defence, a mechanism would be required to control and/or stop water inflow once the mitigation features are filled to the required water level (HR010). Plate 5 illustrates a self-regulating tidal gate structure that has been used in similar situations and would likely be used on this proposal.

Plate 5 Self regulating tide gate at Seaton in Devon (Figure 3.6 in https://assets.publishing.service.gov.uk/media/6033a8f5e90e076607c1bf0e/Self-regulating_tide-gate_a_new_design_for_habitat_creation_technical_report.pdf)

Construction Method

The following sections describe the envisaged construction method required for the installation of the structure within the footprint of the existing flood defence. It is envisaged that in total construction would be up to 12 weeks in duration.

It is assumed that all works within the intertidal area would be restricted to periods of low water.

Construction and excavation of coffer dam

A sheet-piled coffer dam would be constructed to isolate the section of the flood defence in which the structure is to be installed. Isolation via the coffer dam allows the flood defence to be "breached" for the installation of the structure.

Piling works for the coffer dam would be undertaken from a dumb barge with spud legs or anchors on winches, with a 30 to 50 tonne 360 excavator and a multi cat that has a 5 tonne lifting capacity to set anchors as required.

The main piling barge may be serviced by a second dumb feeder barge carrying sheet piles. Alternatively, depending on the final siting of the sluice structure, servicing could be achieved via crane access from the landward side of the defence.

The short sheet piles would be vibro-piled into place (circa 6m "driven" in 4m below trench base) with small vibrating hammer (https://www.omsvibro.com/products/vibratory-hammers/excavator-mounted/). Sheet piling would be installed along either side of the proposed working area forming the coffer dam. Indicatively, the coffer dam would be approximately 10m x 15m, and would not extend beyond the maximum working area defined for the construction works. Excavation of the section of flood defence would take place within the coffer dam to the required depth.

Excavated arisings would be retained within the coffer dam or stored on a support barge or on land. Arisings would not be side cast within the inter-tidal area.

Assumed plant required for construction:

- Dumb barge/Jack up barge/pontoon
- Vibrating Hammer attachment on an excavator, or similar
- Crane – if servicing from land
- Excavator
- Multi Cat with lifting capacity
- Supply barge (for sheetpiles)

Installation of structure

The proposed structure selected to convey the water flow would be installed in the location of the flood defence "breach". Due to uncertainty over ground conditions, this may require additional foundation works and therefore piling has been assumed.

Assumed plant required for construction:

- Dumb barge/Jack up barge/pontoon
- Mini piling rig – on the barge
- Supply barge for precast piles and other materials
- Crane
- Excavator
- Compressor and small tools

Reinstatement

Following the installation of the structure the flood defence would be reinstated / back filled to maintain continuity of the defence around the new structure and maintain the existing public right of way. The sheet piled coffer dam would be removed and any areas excavated back filled as required.

Assumed plant required for construction:

- Dumb barge/Jack up barge/pontoon
- Supply barge
- Excavator
- Multi Cat with lifting capacity

Decommissioning

It is assumed that the structure would be permanent, due to its role in supporting HRA and ecology mitigation. Therefore, decommissioning of the asset would not be assessed.

Secondary Consents and Stakeholder Engagement

Secondary consents

- Deemed Marine Licence
- Preliminary Navigational risk assessment
- River works licence
- Abstraction licence
- Flood Risk Activity Permit

Stakeholders

- Port of London Authority
- Environment Agency
- Marine Management Organisation
- Thurrock Council (as other flood defence owner)
- Natural England
- National Highways
- Landowner

Annex C.9 Flood Risk Assessment – Climate Change (HE540039-CJV- EFR-TNT-ENV-00011)

Lower Thames Crossing

Flood Risk Assessment

Climate Change

DATE: 30/04/2020 **HE540039-CJV-EFR-GEN-TNT-ENV-00011** **VERSION: 1.0**

**** THIS SECTION IS TO BE REMOVED FROM FINAL VERSION OF THE DOCUMENT****

Document control

Document no	HE540039-CJV- EFR-TNT-ENV-00011
Author	[redacted]
Owner	Highways
Distribution	Highways and EA
Document Status	Draft

Revision history

Version	Date	Description	Author
1	22/04/20	1st Draft	[redacted]

Reviewer list

Name	Role
[redacted]	[redacted]

Approvals

Name	Signature	Title	Date	Version
[redacted]		[redacted]	21/04/2020	1.0

Lower Thames Crossing

Flood Risk Assessment

List of contents

Page number

List of tables

Page number

1 Introduction

1.1.1 Climate change has the potential to increase peak rainfall intensity with a corresponding increase in the rate and volume of runoff being discharged to local watercourses and subsequently create an escalation in flood risk. Furthermore, sea levels are also projected to increase as a result of climate change.

1.1.2 This Technical note sets out the approach that Lower Thames Crossing is taking with respect to climate change for the Flood risk Assessment.

2 General

2.1.1 Outputs of the current UK Climate Projections (UKCP18) were published in November 2018 through a web-based user interface, providing climate projections for user-selected locations. The current Environment Agency (EA) guidance on climate change allowances for flood risk assessments[1] was updated in December 2019 to apply UKCP18 sea level rise allowances (and further amended in March 2020 with a minor clarification – i.e. the allowances did not change). Other allowances, including peak rainfall and river flow allowances, were not updated and remain unchanged since before the UKCP18 projections were published.

2.1.2 Lower Thames Crossing will become operational in 2027 and the operational life is up to 2127. The impacts of climate change are therefore assessed up to 2127. The EA's guidance on climate change allowances provides uplifts for rainfall and flow for the period covering 2015 to 2115, and sea level rise for the period covering 2000 to 2125.

2.1.3 In the absence of climate change allowances for 2127, the EA's climate change uplifts to rainfall and flow for 2115 will be adopted for the purposes of this assessment. This approach is consistent with the Environment Agency's climate change guidance for appraisal of flood defence schemes[2]. Sea level rise beyond 2125 will be extrapolated by assuming the same rate of rise (mm/year) as specified for 2125 continues beyond 2125.

2.1.4 The scheme design and assessment will apply the climate change allowances specified in the EA's guidance. In addition, sensitivity testing will be undertaken to consider the potential impacts on the scheme of the H++ climate change scenario. H++ climate change assessment allowances are provided in the Environment Agency's climate change guidance for appraisal of flood defence schemes.

1 Environment Agency, *Flood risk assessments: climate change allowances*, December 2019. (web link)
2 Environment Agency, *Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities, 2016*. (web link)

3 Peak Rainfall Intensity Allowance

3.1.1 Table 3-A shows anticipated changes in extreme rainfall intensity in small and urban catchments, as detailed in the EA's guidance on climate change allowances.

Table 3-A: Peak rainfall intensity allowance in small and urban catchments (using 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated		
	2015 to 2039	2040 to 2069	2070 to 2115
Upper end	10%	20%	40%
Central	5%	10%	20%

3.1.2 For flood risk assessments, the EA guidance states that:

- *For flood risk assessments and strategic flood risk assessments, assess both the central and upper end allowances to understand the range of impact.*
- *Design your drainage system to make sure there is no increase in the rate of runoff discharged from the site for the upper end allowance.*
- *Where on-site flooding for the upper end allowance presents a significant flood hazard (for example, depths and velocities of surface water runoff cause a significant danger to people), you will need to take further mitigation measures to protect people and property (for example, raising finished floor levels). As a minimum, there should be no significant* flood hazard to people from on-site flooding for the central allowance.

3.1.3 As the highway is considered to be Essential Infrastructure and has a protracted operational life, the upper end and central rainfall intensity allowances of 40% and 20% respectively shall be used for the purposes of the FRA.

3.1.4 There are no rainfall allowances specified for the H++ scenario.

4 Peak River Flow Allowances

4.1.1 Peak river flow allowances for climate change are based on river basin districts. The development falls within the Thames River Basin District[3]. The peak river flow allowances for the Thames River Basin District are presented in Table 4-A.

Table 4-A: Peak river flow allowances for Thames river basin district

Allowance category	Total potential change anticipated		
	2015 to 2039	2040 to 2069	2070 to 2115
Upper end	25%	35%	70%
Higher central	15%	25%	35%
Central	10%	15%	25%
Note: Allowances are for 1961 to 1990 baseline flows			

4.1.2 The application of the allowance category is a function of flood risk vulnerability classification for the type of development and the flood zone. A matrix of allowances for peak river flows is presented in Table 4-B.

Table 4-B: Peak river flow allowances by flood risk vulnerability and the flood zone

Flood risk vulnerability classification		Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Flood zone (s)	Zone 2	Upper end	Higher central Upper end	Higher central Upper end	Central Higher Central	Central
	Zone 3a	Upper end	Development should not be permitted	Higher central Upper end	Central Higher Central	Central
	Zone 3b	Upper end	Development should not be permitted	Development should not be permitted	Development should not be permitted	Central

4.1.3 As the highway is considered to be Essential Infrastructure and will have a protracted operational life, peak river flow allowances of 70% shall be used for the purposes of the FRA.

4.1.4 The H++ scenario flow uplifts for the Thames River Basin District is 80% for the 2080s (2070-2115). This uplift will be simulated as a sensitive test to consider the potential impact of the H++ climate change scenario on the scheme.

[3] Environment Agency, *River basin district map*, 2015

5 Sea Level Rise Allowances

5.1.1 The EA guidance specifies sea level rise allowances to be applied in flood risk assessments. These allowances are reproduced in Table 5-A.

Table 5-A: Flood risk assessment sea level allowance for each epoch in mm per year, with total sea level rise for each epoch in brackets (use 1981 to 2000 baseline)

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)	Cumulative rise 2000 to 2127 (extrapolated beyond 2125) (metres)
South east, Thames	Higher Central	5.7 (200)	8.7 (261)	11.6 (348)	13.1 (393)	1.20	1.23
	Upper end	6.9 (242)	11.3 (339)	15.8 (474)	18.2 (546)	1.60	1.64

5.1.2 The EA guidance specifies:

- *For flood risk assessments and strategic flood risk assessments, assess both the central and upper end allowances to understand the range of impact.*

5.1.3 Where the LTC assessment has applied higher central allowances, these are taken directly from the EA guidance (Table 5-A).

5.1.4 Where the LTC assessment has applied upper end allowances, these are consistent with the EA guidance upper end allowances, as follows:

- After the UKCP18 projections were published in November 2018, and prior to the updated EA guidance being published in December 2019, the Project applied interim sea level rise allowances as advised by the EA. These interim sea level allowances were those of the UKCP18 RCP 8.5 climate change scenario, extrapolated beyond 2100 to 2127 by applying the 2100 rate of sea level rise for the period beyond 2100. These interim sea level rise allowances are essentially the same as the EA guidance upper end allowances, as shown in **Error! Reference source not found.**Table 5-B, which compares the sea level rise allowances that were applied to the EA's Coastal Flood Boundary 2018 (CFB2018) extreme water level dataset (base year 2017) to those derived applying the EA guidance (relative to the 2017 base year). The allowances are identical for 2027, and the LTC interim allowances applied are 3.4mm higher for 2127 than the EA guidance upper end allowances.

Table 5-B: Comparison of the LTC interim sea level rise allowances with the EA guidance (relative to the 2017 base year of the CFB2018 dataset applied)

Allowance	Sea level rise allowance (mm)	
	2017 to 2027	2017 to 2127
LTC allowances (UKCP18 - RCP 8.5)	69	1523.0

Allowance	Sea level rise allowance (mm)	
	2017 to 2027	2017 to 2127
EA guidance: South east - upper end	69	1519.6
Difference (LTC allowance – EA guidance)	0	3.4

5.1.5 As the LTC allowances applied are consistent with the EA guidance (the 3.4mm higher allowance applied for 2127 in the LTC assessment is considered insignificant), the LTC climate change assessment applying the interim sea level rise allowances was not re-worked to apply the EA guidance values published in December 2019.

5.1.6 The H++ Sea Level Rise allowances are listed in Table 5-C.

5.1.7 The LTC will be designed to the climate change allowances specified for the project (i.e. consistent with EA guidance upper end sea level rise allowances).

5.1.8 Due to the nature of the road design, it will not be adaptable to the higher H++ climate change scenario, and the road could be inundated for the H++ design event. This will be assessed from consideration of the amount of additional sea level rise under the H++ rather than by hydraulic modelling. The LTC project does not propose simulating the H++ scenario by hydraulic modelling as available estuary water level time series are not available from the Environment Agency's TE2100 modelling.

Table 5-C: H++ sea level allowance for each epoch per year with cumulative sea level rise for each epoch in brackets (use 1990 baseline)

Area of England	1990 to 2025	2026 to 2050	2051 to 2080	2081 to 2115	Cumulative rise 1990 to 2115	Cumulative rise 1990 to 2120 (extrapolated beyond 2115)	Cumulative rise 1990 to 2127 (extrapolated beyond 2115)
East, east midlands, London, south east	6 mm/yr (210 mm)	12.5 mm/yr (312.5 mm)	24 mm/yr (720 mm)	33 mm/yr (1155 mm)	2.40 m	2.56 m	2.79 m

Annex C.10 Flood Risk Assessment – Future Thames Barrier Breach Modelling (HE540039-CJV-EFR-GEN-TNT-ENV-00101)

Lower Thames Crossing

Flood Risk Assessment

Breach modelling: Considering TE2100 future barrier options

DATE: 07/10/2022 **HE540039-CJV-EFR-GEN-TNT-ENV-00101** **VERSION: 1.0**

**** THIS SECTION IS TO BE REMOVED FROM FINAL VERSION OF THE DOCUMENT****

Document control

Document no	HE540039-CJV-EFR-GEN-TNT-ENV-00101
Author	[redacted]
Owner	Highways
Distribution	EA
Document Status	Draft

Revision history

Version	Date	Description	Author
1	01/02/2021	1st Draft	[redacted]

Reviewer list

Name	Role
[redacted]	

Approvals

Name	Signature	Title	Date	Version

Lower Thames Crossing

Flood Risk Assessment

List of contents

Page number

1 Introduction

1.1 Background

1.1.1 The Lower Thames Crossing (LTC) breach assessment, undertaken to inform the LTC Flood Risk Assessment (FRA), includes breach simulations for the present day (2027) and future (2127) for return periods 200 years (0.5% AEP) and 1000 years (0.1% AEP). Breaches were simulated at the following TE2100 model nodes:

- 3.15 (Mardyke Sluice breach location)
- 3.26 (TIL005 breach location)
- 3.28 (TIL006 breach location)

1.1.2 Further details of the breach modelling undertaken are in Part 5 of the LTC FRA, Appendix F (Application Document 6.3).

1.1.3 The LTC FRA breach simulations did not consider the future Thames barrier options, as set out in the TE2100 plan (TE2100 Phase 3 Topic 1.5 Set 2 Estuary Wide Options - Hydraulic Modelling, Environment Agency (December 2008) and TE2100: Design Water Levels and Future Defence Crest Levels, Environment Agency, (May 2015)). Following consultation with the Environment Agency, this technical note extends the LTC FRA breach assessment to also consider breaches assuming the following TE2100 future Thames barrier (and flood defences) options:

- Option 1.4 (barrier at Woolwich)
- Option 3.2 (barrier at Long Reach)
- Option 3.1 (barrier at Gravesend Reach)

1.1.4 The breach modelling undertaken to date for the LTC FRA assumes that during a simulated breach of the River Thames tidal defences, flood water is conveyed into the tidal floodplain only through the breach opening (i.e. no overflow of tidal flood defences), as the simulated Extreme Water Levels (EWLs) for all breaches simulated are below flood defence levels. This assumption remains valid when considering the TE2100 future Thames barrier Options 1.4, 3.2 and 3.1, as these options specify that the flood defence heights would be upgraded when required for each option to provide the required standard of service specified by the TE2100 plan (which is greater than or equal to 1000 years at the LTC breach locations, and so above the 1000 year return period EWL applied in the breach simulations).

1.2 Potential for TE2100 future barrier options to influence the LTC FRA breach assessment

1.2.1 Results of a simulated breach assuming the future barrier Options 1.4, 3.2 and 3.1 in 2127 may differ to results of the LTC FRA breach simulations already undertaken, since:

- Future barrier options may result in different River Thames design EWLs compared to those applied in the LTC FRA breach modelling.
- Future barrier options may specify different future tidal flood defence levels (in 2127) compared to those applied in the LTC FRA breach modelling. The LTC FRA breach simulations undertaken and the future barrier options both assume that the 1000 year return period River Thames EWLs in 2127 would be below the River Thames tidal flood defence levels in 2127 at the LTC FRA breach locations. However, the specification of simulated breach start and end times is influenced by flood defence heights (Breach of Defences Guidance, Environment Agency, 2018), and so a change in flood defence levels (in the barrier options) results in a change in specified breach start and end times.

2 Assessment of TE2100 future barrier options

2.1 Comparison of EWLs for TE2100 future barrier options with those applied in LTC FRA breach modelling

2.1.1 The LTC FRA breach modelling applied EWLs derived from TE2100 EWLs, adjusted to account for the more recent Environment Agency Coastal Flood Boundary dataset 2018 (CFB2018) and UKCP18 projected sea level rise allowances.

2.1.2 The TE2100 simulated EWLs for Option 1.4 (TE2100: Design Water Levels and Future Defence Crest Levels, Environment Agency (May 2015)) are the same as the TE2100 EWLs from which the LTC FRA breach modelling EWLs were derived, as this option assumes no change to the tidal barrier location in the future.

2.1.3 The TE2100 simulated EWLs for TE2100 Options 3.2 and 3.1 differ from those of Option 1.4 as Options 3.2 and 3.1 represent a change in tidal flood barrier location (with future barriers at Long Reach and Gravesend Reach respectively).

2.1.4 Table 1 compares EWLs applied in the LTC FRA breach modelling (including the TE2100 EWLs provided by the Environment Agency and adjusted values accounting for CFB2018 and UKCP18) with those simulated for the TE2100 Options 1.4, 3,2 and 3.1, at LTC breach locations Mardyke Sluice, TIL005 and TIL006.

2.1.5 A comparison of EWLs applied in the LTC FRA with those simulated for the TE2100 Options 1.4, 3,2 and 3.1 should be based on the TE2100 EWLs provided for use in the LTC FRA rather than the adjusted EWLs. This provides a “like-for-like” comparison, as all values compared are then based on the TE2100 modelling and boundary conditions.

Table 1: Mardyke Sluice: EWLs applied in the LTC FRA breach modelling and EWLs simulated for the TE2100 Options 1.4, 3,2 and 3.1

	1000 year (0.1% AEP) Extreme Water level values (mAOD)				
Year	**TE2100 EWLs provided for LTC FRA**	***Applied in LTC breach modelling**	**[1]TE2100 Option 1.4**	**[2]TE2100 Option 3.2**	**[3]TE2100 Option 3.1**
TE2100 model node 3.15 (Mardyke Sluice breach location)					
2120	6.85		6.85		
2127	6.92**	7.06			
2140	7.04**			5.40	5.40
2170	7.33		7.33	5.40	5.40
TE2100 model node 3.26 (TIL005 breach location)					
2120	6.65		6.65		
2127	6.73**	6.87			
2140	6.87**			6.88	5.18
2170	7.19		7.19	7.24	5.18
TE2100 model node 3.28 (TIL006 breach location)					
2120	6.56		6.56		
2127	6.65**	6.82			
2140	6.80**			6.83	6.61
2170	7.17		7.17	7.21	7.06

** The LTC EWLs adjust TE2100 values according to the latest Environment Agency Coastal Flood Boundary dataset 2018 and UKCP18 sea level rise values. Full details of this adjustment are in the LTC FRA breach modelling appendix (FRA Part 5).*

*** Interpolated values to aid comparison with values applied in the LTC breach modelling and other TE2100 options*

1 – Source: Table A.5 in TE2100: Design Water Levels and Future Defence Crest Levels, Environment Agency (May 2015)

2 – Source: TE2100 Phase 3 Topic 1.5 Set 2 Estuary Wide Options - Hydraulic Modelling, Environment Agency (December 2008). 2140 EWLs taken from Table 4.8, 2170 EWLs taken from Table 4.10

3 – Source: TE2100 Phase 3 Topic 1.5 Set 2 Estuary Wide Options - Hydraulic Modelling, Environment Agency (December 2008). 2140 EWLs taken from Table 4.7, 2170 EWLs taken from Table 4.9

2.1.6 Table 1 indicates:

- Option 1.4 EWLs are the same as the TE2100 EWLs provided for use in the LTC FRA breach modelling at all LTC FRA breach locations.
- Option 3.2 EWLs are;
  - lower than the TE2100 EWLs provided for use in the LTC FRA breach modelling at the Mardyke Sluice breach location.
  - slightly higher than the TE2100 EWLs provided for use in the LTC FRA breach modelling at TIL005 and TIL006 breach locations by approximately 0.01m and 0.03m respectively (based on values for 2140, highlighted orange in Table 1).
- Option 3.1 EWLs are lower than the TE2100 EWLs provided for use in the LTC FRA breach modelling at all LTC FRA breach locations.

2.1.7 In summary, the EWLs presented in Table 1 indicate the TE2100 future barrier Options 1.4, 3.2 and 3.1 would not result in a significant increase in EWLs at the LTC FRA breach locations in 2127, with increases only for Option 3.2 by up to 0.03m (based on values for 2140).

2.1.8 An increase in EWLs by up to 0.03m is considered insignificant compared to other assumptions and uncertainties in assessing breach impacts in 2127. Other assumptions and uncertainties include:

- The CFB2018 stated 2.5% and 97.5% confidence intervals in the 1000 year return period EWL at Southend in the CFB2018 base year (2017) are -0.49m and +0.60m respectively (and these confidence intervals only account for statistical uncertainty).
- There is significant uncertainty in estimating future sea level rise due to climate change.
- There is uncertainty in the TE2100 hydraulic modelling.
- The breach modelling guidance applies assumptions (e.g. breach width, start time and duration) which may or may not be representative of an actual breach, should one occur in the future.
- There is uncertainty in the hydraulic modelling of breach propagation inland.

2.1.9 The increase in EWLs by up to 0.03m is therefore considered insignificant in the context of the wider assumptions and uncertainties in assessing breach impacts in 2127, and, with respect to the EWLs applied, the LTC FRA breach simulations results are considered an appropriate assessment of future breach flood risk i.e. the LTC FRA assessment of the impact of the LTC Project on breach flood risk elsewhere, and the impact of a breach on the LTC Project, is considered robust in this regard.

2.2 Comparison of flood defence levels for TE2100 future barrier options with those applied in LTC FRA breach modelling

2.2.1 The EA breach simulation guidance specifies a simulated breach start time to be when flood levels reach ¾ of the flood defence height. For a given EWL, a change in flood defence levels at a simulated breach location therefore has potential to impact on the simulated breach impacts. The TE2100 future Options 1.4, 3.2 and 3.1 require changes in flood defence levels at the LTC FRA breach locations, as detailed in Table 2 which lists:

- Existing flood defence levels at the LTC FRA breach locations as applied in the LTC breach modelling and as reported in TE2100 reports (report references are in Table 2).
- Required future flood defence levels for the TE2100 Options 1.4, 3.2 and 3.1 at the LTC FRA breach locations, as reported in TE2100 reports (report references are in Table 2).

Table 2: Existing and future flood defence levels at LTC FRA simulated breach locations

				Required future defence level in 2127 (mAOD)		
LTC FRA breach location	**TE2100 model node**	**LTC FRA breach modelling assumed defence level (mAOD)**	**Existing defence level (according to TE2100 reporting) (mAOD)**	**Option 1.4**	**Option 3.2**	**Option 3.1**
Mardyke Sluice	3.15	7.16[1]	7.05[4]	8.10[4]	6.10[4]	6.90[5]
TIL005	3.26	6.48[2]	6.65[4]	7.90[4]	8.00[4]	6.63[5]
TIL006	3.28	4.99[3]	7.00[4]	7.00[4]	7.00[4]	6.63[5]

1 – Source: Lower Thames Crossing channel topographic survey, undertaken for this study – Storm Geomatics (November/December 2018)

2 – Source: Information received from Environment Agency for Asset Number 152988 (Datasheet reference EAN/2018/76391, 2018)

3 – Source: Environment Agency Bowaters Sluice "as built" drawing

4 – Source: Table 7.1 in TE2100: Design Water Levels and Future Defence Crest Levels, Environment Agency (May 2015)

5 – Source: Table 4.9 in TE2100 Phase 3 Topic 1.5 Set 2 Estuary Wide Options - Hydraulic Modelling, Environment Agency (December 2008)

2.2.2 Where Table 2 indicates a required future flood defence level is lower than the existing flood defence level:

- It is assumed the level of the existing flood defence would not actually be lowered in the future.
- The requirement for a lower flood defence level arises from a lower design EWL (for that future barrier option and location) than the equivalent TE2100 EWL provided for use in the LTC FRA. The simulated impacts of a breach for these options would therefore be lower than the LTC FRA simulations.

2.2.3 Therefore only the future barrier options with increased EWLs compared to the TE2100 EWLs provided for use in the LTC FRA, and/or increased flood defence levels if required, have potential to result in increased simulated breach impacts. As discussed earlier, the impact of increased EWLs by up to 0.03m is considered insignificant, and so the following considers the influence on simulated breach events of increasing flood defence levels.

2.2.4 Figures 1 to 3 show the influence of increasing flood defence levels on breach start and end times for the LTC FRA breach simulations. The change in breach start and end times is shown for the highest required future defence levels (i.e. the future defence levels that are most different to those assumed in the LTC FRA breach simulations, highlighted in orange in Table 2).

Figure 1: Impact of increased defence levels on breach start and end times at Mardyke Sluice breach (based on future level for Option 1.4 in 2127)

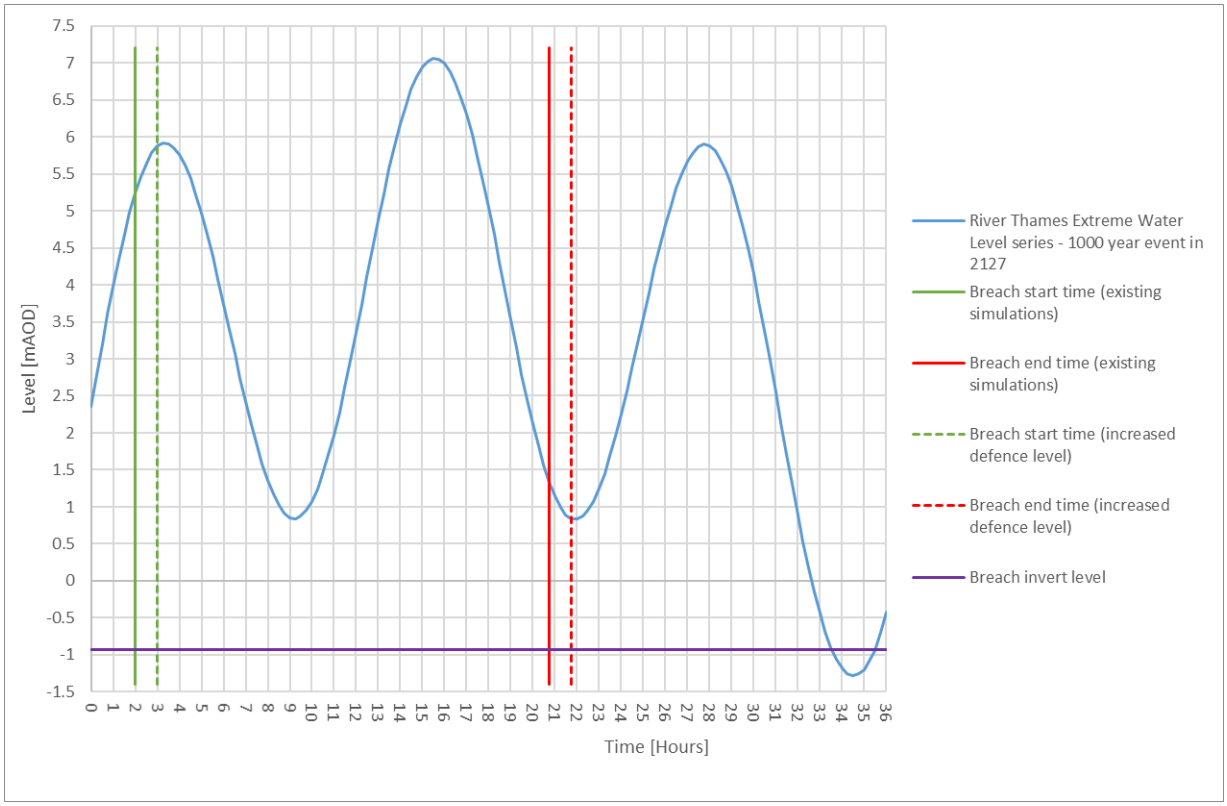


Figure 2: Impact of increased defence levels on breach start and end times at TIL005 breach (based on future level for Option 3.2 in 2127)

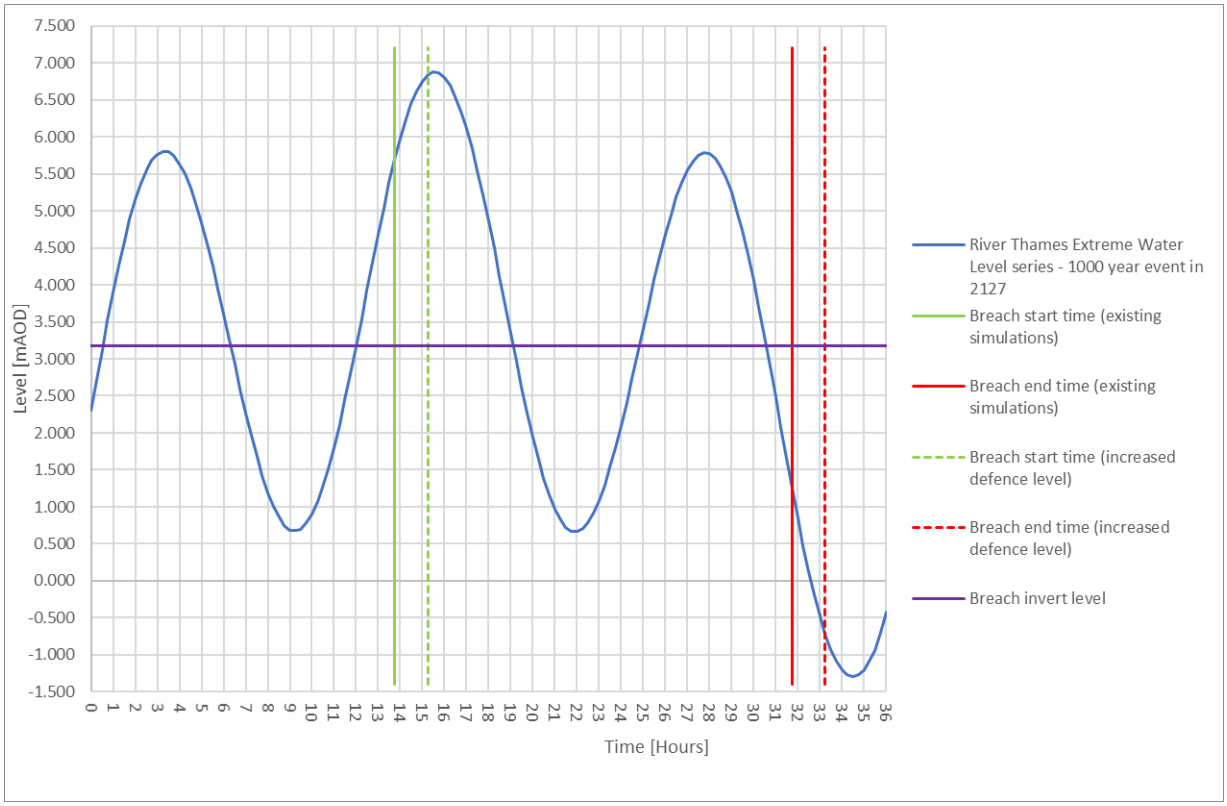
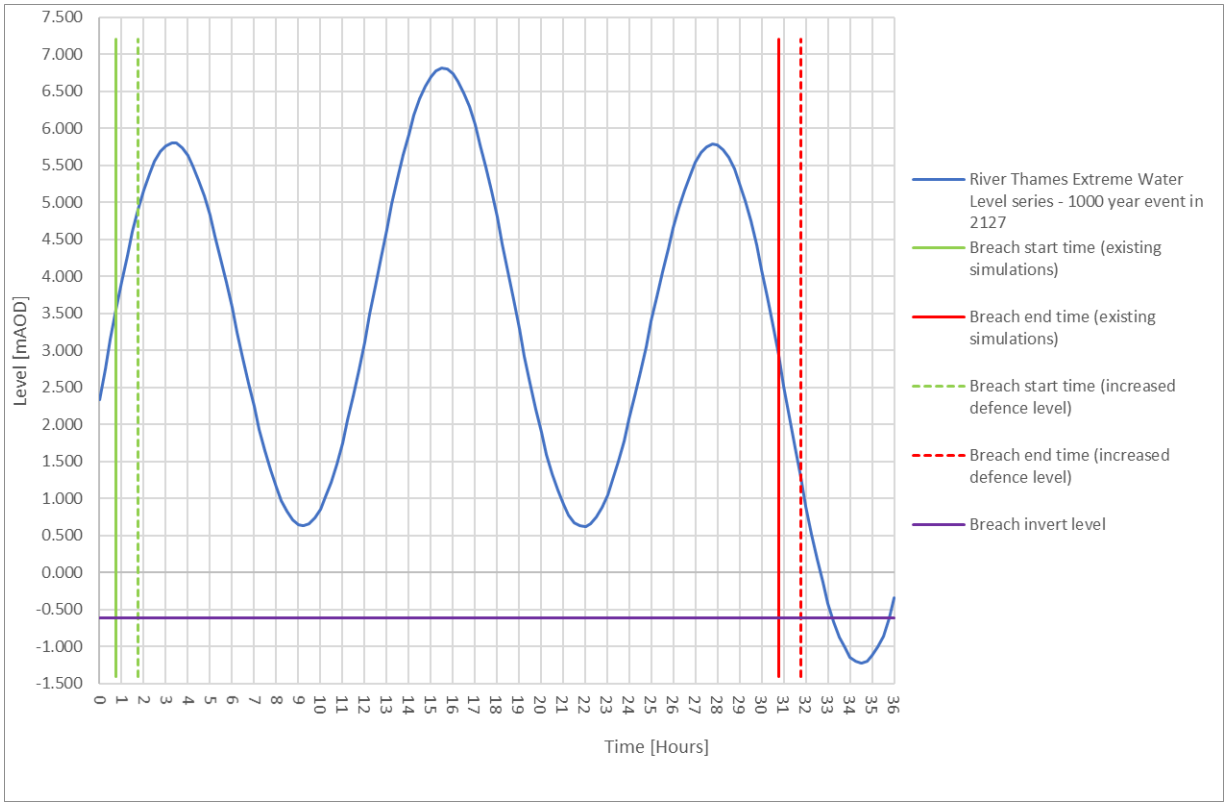


Figure 3: Impact of increased defence levels on breach start and end times at TIL006 breach (based on future level for Option 3.2 in 2127)



2.2.5 Figures 1 to 3 show that for all LTC FRA breach locations, applying higher flood defence levels results in a delay in the start and end times of simulated breaches. An inspection of Figures 1 to 3 indicates that the reduction in initial breach flows resulting from increased defence levels (due to a delayed start) would exceed the gain in breach flows at the end of the simulated breach event, as River Thames flood levels are higher at the start of simulated breach events than at the end of the events (and for TIL005 there would be no gain in breach flows at the end of the simulated breach event, as River Thames levels would be below the TIL005 breach invert level at the end of the simulated beach). There would therefore be an overall reduction in simulated breach flood volume as a result of increasing flood defence levels.

2.2.6 The LTC FRA breach simulation results show the nearest parts of the LTC Project within TIL005 and TIL006 breach event flood extents are approximately 2km and 0.8km respectively from the breach locations, with simulated peak velocities significantly lower than at the breach locations. The influence of an increase in flood defence levels on breach impacts at the LTC Project would therefore be dominated by total breach volume (i.e. breach flood extent and level).

2.2.7 Simulating increased flood defence levels would therefore be expected to reduce breach event peak flood levels and extents slightly in the vicinity of the LTC Project (and a breach of Mardyke Sluice would remain in-channel at the LTC Project location, as is the case for the breach simulations undertaken for the LTC FRA), such that the LTC FRA breach simulations already undertaken portray a slightly more conservative case in the future (2127) than the alternative future barrier options.

2.2.8 The slight reduction in breach flood volumes as a result of increased flood defence levels is considered insignificant in the context of the wider assumptions and uncertainties in assessing breach impacts in 2127 listed in paragraph 2.1.8. The LTC FRA breach simulations results are therefore considered an appropriate assessment of future breach flood risk i.e. the LTC FRA assessment of the impact of the LTC Project on breach flood risk elsewhere, and the impact of a breach on the LTC Project, is considered robust in this regard.

3 Conclusions

3.1.1 This technical note:

- Extends the LTC breach assessment to also consider breaches assuming the following TE2100 future Thames barrier (and flood defences) options:
  - Option 1.4 (barrier at Woolwich)
  - Option 3.2 (barrier at Long Reach)
  - Option 3.1 (barrier at Gravesend Reach)
- Considers the potential for changes in River Thames EWLs and required flood defence levels in the future, as a result of implementing any of the future barrier Options 1.4, 3.2 and 3.1, to influence future breach flood risk.
- Concludes that the LTC FRA breach simulation results provide an appropriate assessment of future breach flood risk i.e. the LTC FRA assessment of the impact of the LTC Project on breach flood risk elsewhere, and the impact of a breach on the LTC Project, is considered robust. Therefore no further breach simulations are required to account for TE2100 future barrier options 1.4, 3.2 and 3.1.

Annex C.11 Bowaters Sluice and East Tilbury Tidal Wall Monitoring Assessment (HE540039-LTC-GEN-GEN-TNT-TPI-00001)

Lower Thames Crossing

Bowater Sluice and East Tilbury Tidal Wall monitoring assessment

Technical Note

Document Number: **HE540039-LTC-GEN-GEN-TNT-TPI-00001**

<Confidential>

Revision	Production Date	Prepared by	Checked by	Approved for release by	Sections revised
1.0	*02/December/2021*	[redacted]			*First Issue*

This document has been prepared for Highways England in accordance with the terms and conditions of appointment defined in the Lower Thames Crossing (LTC) Technical Partner Contract. LTC cannot accept any responsibility for any use of or reliance on the contents of this document by any third party.

Contents

1. Executive Summary

The purpose of this Technical Note is twofold:

- To provide an overview of the main factors that govern the behaviour of the area around Bowater Sluice and the East Tilbury Tidal Wall.
- To express the constrains for a successful monitoring program of the assets prior to the construction of the Lower Thames Crossing main tunnels (Baseline).

This Technical Note is based on limited information and its result could be reassessed when more information becomes available. The assessment has been carried out based on information provided by the Environment Agency (owner of the asset), and two site visits on 14th March 2019 and 30th September 2021.

2. Location of the assets

Bowater Sluice and East Tilbury tidal wall are located in the North bank of Thames river, Essex, approximately 1600m Southwest of Coalhouse Fort and 2800m East of Tilbury Fort.

In respect to the LTC scheme, the area is approximately 300 metres East of the Main Tunnels, according to DR3.0. See Figure 1 for reference.

Figure 1

3. Description

There are two independent but related assets in the area, Bowater Sluice and the East Tilbury tidal wall, directly above the first.

Bowater Sluice

Bowater Sluice is an asset designed to prevent the entrance of water from the Thames river and the tide to the canal behind it. The structure is thought to be constructed in the decade of 1960. It has a bore of pipe estimated in 18 or 24 inches. It is constructed with engineering brick and concrete capping slab. The asset is thought to have been constructed around 1960.

The brickwork is in poor condition showing signs of displacement and cracking. The reason behind this is not known. The condition of the internal pipework is not known either.

East Tilbury Tidal Wall

The East Tilbury Tidal Wall is an asset constructed after or during 1976 or 1979, as the only documents related to it provided by the EA are from these years (See Appendix 1). The purpose of the asset seems to be related to protect the sluice under it from erosion.

The asset is an L-shaped cantilever retaining wall made of reinforced concrete and divided in nine independent sections. Sealed expansion joints run between the different sections. Some of the joints are in poor condition.

The asset is covered in graffities and its concrete seems to be in good state, with no apparent cracking or spalling in any section. Nevertheless, there are mild signs of displacement between these sections, mainly at both ends of the structure. The middle sections don't seem to be suffering any displacement. There is some cracking present at the edge of one of the sections (Figure 2), probably caused by said displacement.

There is actually an active erosional area West of the asset, which is related to the existing local water circulation. The asset is protected by a slabbed area to protect the structure from erosion, which has been already affected as seen in figures 3 and 4. There's no evidence of erosion in the immediate area East of the wall.

The soil above high tide level surrounding these two assets seems to be made ground.

Figure 2

Figure 3

Figure 4

4. Discussion

The eligibility criteria for Baseline I&M stated in document HE540039-CJV-GEN-GEN-REP-CLO-00008 – Baseline Instrumentation and Monitoring Report – have been followed to assess whether the assets are susceptible to be included in the current Baseline I&M scope.

Both assets lie beyond the zone of influence of the works, as per documents HE540039-CJV-GEW-GEN-REP-TPI-00001 and HE540039-CJV-GEN-GEN-TNT-GEO-00100. They include the 1mm settlement contour, which is considered the zone of influence of the works (ZoI).

Bowater Sluice

As stated before, there are signs of displacement and cracking in the brickwork. Although the reason behind this is not known, it is most likely that movement of the ground underneath has caused the damage over the years.

In earlier stages of the design of the alignment, the water discharge route from the North portal compound was designed to flow through Bowater Sluice. This could negatively impact the structural health of the asset.

To avoid it, Lower Thames Crossing devised a solution so this asset will not be affected by the works. A draft of this proposal is shown in document "North Portal Discharge Assumptions" (HE540039-CJV-EGN-S07-TNT-ENV-00002). Although this document has a BC number assigned, the document has not been published on BC as of December 2021.

Regarding the zone of influence of the works, it is not possible that this structure will be affected by the settlement produced by drilling the main tunnels, as it rests well beyond this boundary (approximately 250m away from the 1mm settlement contour).

East Tilbury Tidal Wall

The EA has expressed concerns about the stability of this asset in relation to the LTC works. As stated before, the asset lies approximately 250m away from the zone of influence of the Main Works.

Although the structure shows some displacement between its different sections, it is not known what is causing this movement. It is not known either whether these displacements are still active.

Mechanisms that can affect the stability of the assets

Hypothetically, the ways these assets can be affected by the LTC works are the following:

- Settlement by tunnelling.
- Accumulating or excavating a sizeable volume of earths near the structure, i.e., an embankment or a cutting.
- Local erosion-sedimentation dynamics in the estuary.

As mentioned above, document HE540039-CJV-GEN-GEN-TNT-GEO-00100 presents the Stage 1 ground movement assessment for the bored tunnels, the portals and the approach to the portals based on Design Release (DR) DR2.11, including the 1mm settlement contour.

The ZoI in the North bank area extends approximately 50 metres at each side of the tunnels. The assets object of discussion here are beyond this line, as they are approximately 300 meters away from the nearest of the tunnels.

Document HE540039-CJV-GEN-GEN-TNT-GEO-00223 analyses settlement on existing assets due to the main tunnels' boring, under Design Release 3.0.

As none of the assets were inside the zone of influence of the works, no settlement analysis was deemed necessary to be carried out.

Nevertheless, the Flood Defence Embankment, on the South bank, was assessed for expected displacements due to tunnelling. The settlement analysis on the South bank can be considered comparable to the expected displacements for the North bank as the method used (Attewell et al., 1986) does not take into account the geology of the area assessed.

According to this assessment, the maximum vertical displacement expected in the Flood Defence Embankment is near 70 mm over the crown of one of the tunnels and 60 mm over the second tunnel.

The induced settlement will modify the channel bed and the shoreline. Still, this amount of expected settlement is not deemed to generate a significant impact on the currents. Also, as the estuary has mobile sediments, on the event of any displacement the river bed and the sediment would just adapt to any small changes. In addition, the displacements are within typical modelling tolerances, especially in a large estuary with sediment load as the Thames's.

Notes on the morphology of the North bank and its shoreline.

A quick analysis of the aerial imagery of the zone reveals several erosional landforms in the shoreline of the North bank. The affected areas are shown in figures 5 and 6. A detail of the area of erosion near the assets was shown in figures 3 and 4. No erosional forms have been found in the opposite shoreline.

Figure 5

The two zones affected by erosion seem to be related to small headlands or raised areas found at the East of the eroded zones. It suggests that the governing currents are in direction East to West in this area and side of the river, which coincides with the general circulation pattern in estuaries given the influence exerted by Coriolis acceleration. The hypothesis is that these raised areas could disturb the currents and generate enough turbulence as to erode the shoreline in the locations indicated in figure 6.

Figure 6

Monitoring options

As shown in figure 3, the asset is covered in graffities, and any part of it can be accessed easily by pedestrians. This ease of access implies that any monitoring instrument installed on the asset has a high chance of being vandalised at any moment, becoming useless after a short period of time, particularly in case of automated monitoring.

The only fully automatic monitoring option that could be of some help is satellite monitoring (InSAR), provided that:

- The asset has natural signal reflectors, as any reflector installed as part of the monitoring program could be vandalised.
- It would be needed a long baseline to understand the behaviour of the asset under different conditions, including tides, as a satellite produces an image of an area each 7 to 12 days, depending on the satellite.
- There is at least another on-site monitoring method supporting InSAR data, as the displacements of the asset could be complex to interpret due to tidal influence.

The most appropriate supporting methods will need on-site stable references, which would be difficult to produce given the influence of the tides in the area. Also, any manual monitoring method will have to match the satellite monitoring frequency for an easier interpretation of the data, which can be difficult to achieve.

5. Conclusions

- Three hypothetical mechanisms of action are deemed capable of de-stabilising the assets: settlement by tunnelling, accumulating or excavating earths and modifying the existing currents.
- The assets are too far from the zone of influence of the works as to be affected.
- No excavation or earth accumulation is planned near the assets.
- The East Tilbury Tidal Wall is thought to be affected by displacements at least on both ends of the asset.
- Further erosion in the West tip of the East Tilbury tidal wall area can be affecting the asset now or could do it in the future.
- It is not known whether this erosive process can explain all the displacements on the West tip of the wall.
- Origin of displacements on the East tip of the asset is not known.
- Bowater Sluice is not going to be affected by the LTC works.
- The effect of the modification of the shoreline and the river bed due to settlement is deemed not enough to generate visible effects on the erosion-sedimentation dynamics in the area.
- The governing local current in this area of the estuary is thought to be East to West, so any effects would become evident West of the main tunnels and not East, where the assets are placed.
- Any monitoring system installed on the asset must consider tidal effects and vandalism as a handicap to overcome, in order to achieve stable, accurate and trustworthy data during the life of the project to match the standards required throughout and beyond its execution.

6. Recommendations

- None of the assets assessed in this technical note are thought to be affected by the LTC Main Works, directly or indirectly, therefore they are not proposed for monitoring.
- Shall more information become available, the assets should be reassessed as indicated in document HE540039-CJV-GEN-GEN-REP-CLO-00008 – Baseline Instrumentation and Monitoring Report.
- In the event of these assets being monitored, any solution must consider the effect of tides on the area and the risk of any instrument being vandalised.

7. References

HE540039-CJV-GEN-GEN-REP-CLO-00008 – Baseline Instrumentation and Monitoring Report.

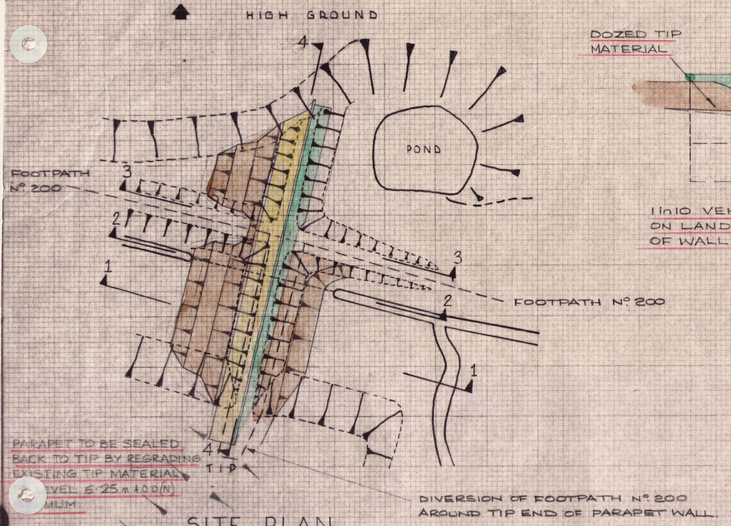
HE540039-CJV-GEN-GEN-TNT-GEO-00223 – Ground Movement Assessment (Stage 2) – Main Crossing.

HE540039-CJV-GEW-GEN-REP-TPI-00001 – Stage 1 Damage Assessment Report – Permanent Works.

HE540039-CJV-GEN-GEN-TNT-GEO-00100 – Ground Movement Assessment (Stage 1) - Main Crossing.

HE540039-CJV-EGN-S07-TNT-ENV-00002 – North Portal Discharge Assumptions.

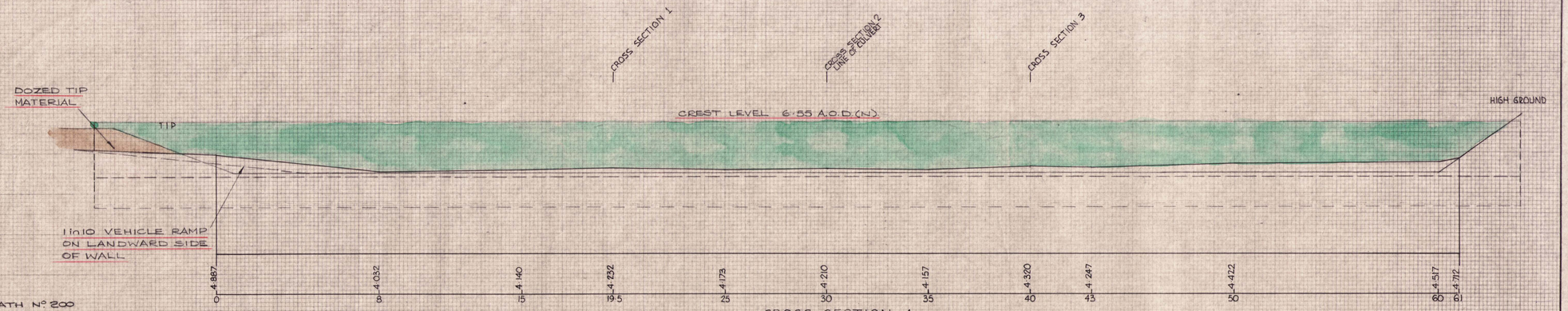
8. Appendix 1. East Tilbury Tidal Wall and Star Dam plans



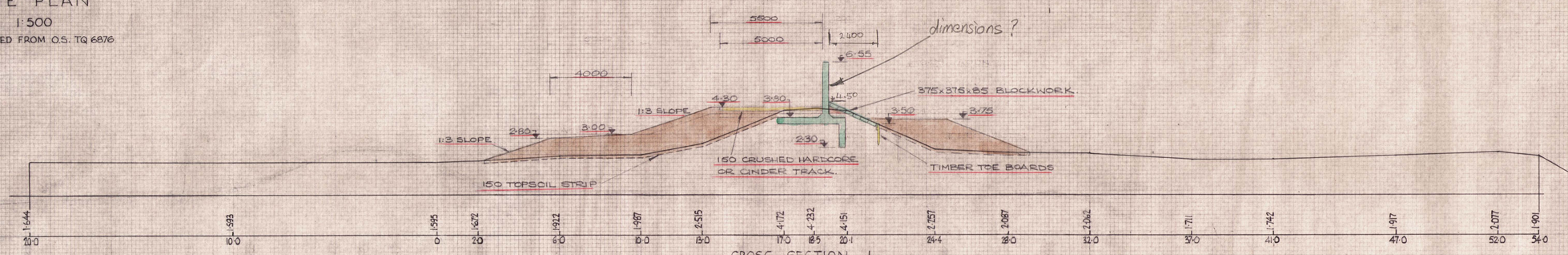
SITE PLAN

1:500

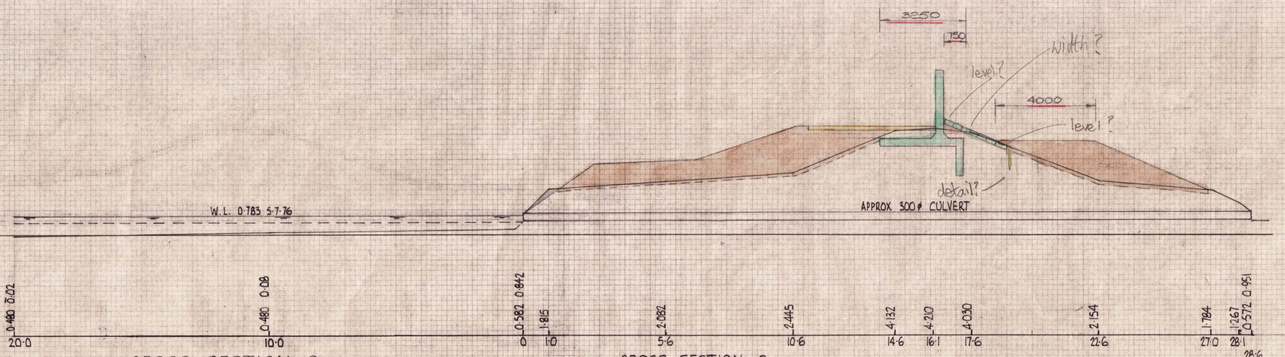
ENLARGED FROM O.S. TQ 6876



CROSS SECTION 4

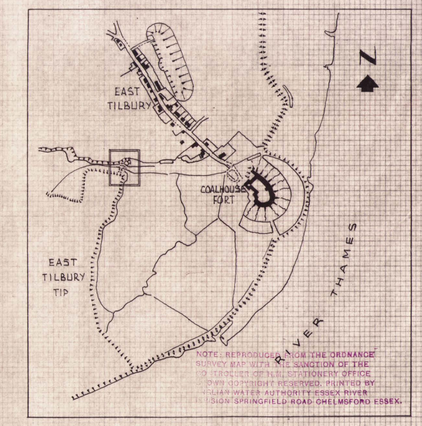


CROSS SECTION 1



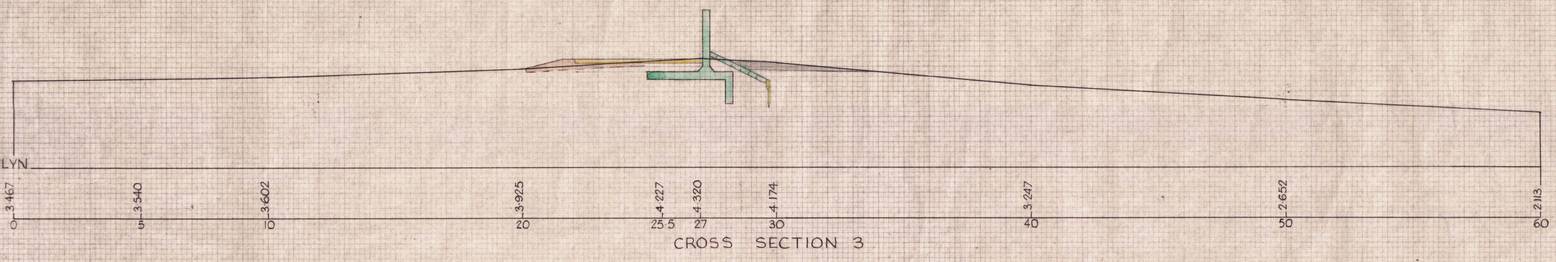
CROSS SECTION 2

CROSS SECTION 2



LOCATION PLAN

1:10560



CROSS SECTION 3

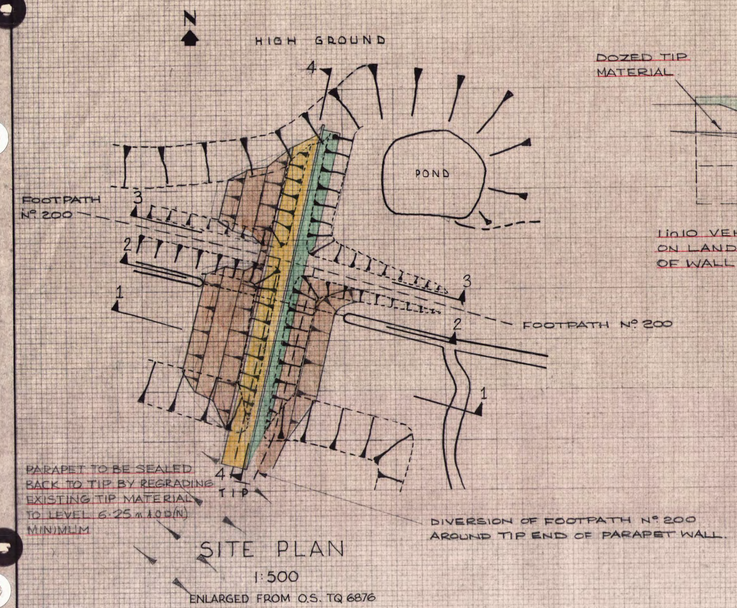
ANGLIAN WATER AUTHORITY
ESSEX RIVER DIVISION
DRAWING OFFICE
- 5 SEP 1977

NOTES

1) TEMPORARY WORKS TO BE CONSTRUCTED FOR MAINTAINING EXISTING DEFENCE LEVEL DURING WORKS PERIOD.

OFFICE COPY

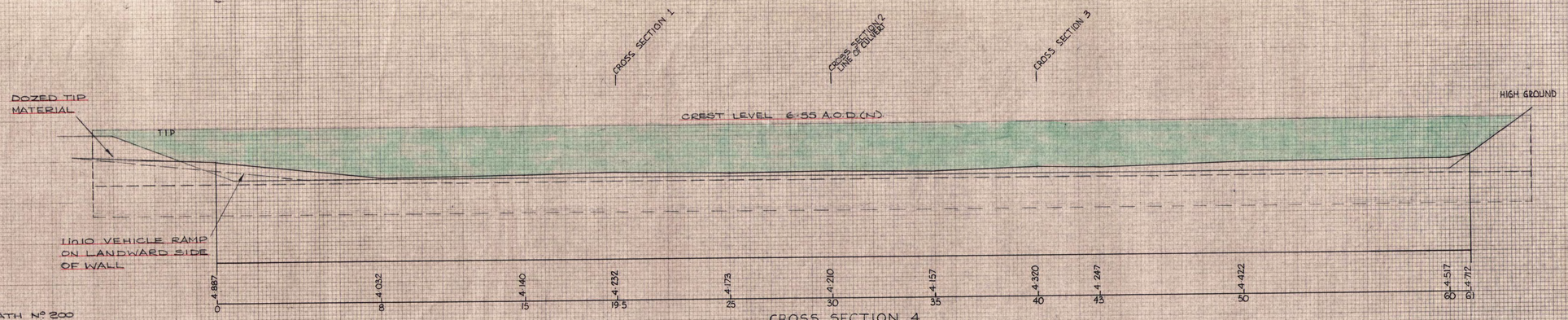
CATCHMENT	ANGLIAN WATER AUTHORITY ESSEX RIVER DIVISION	76/3946/11A	A. Mascall DIVISIONAL ENGINEER
DWGS. FOR REFERENCE	AMENDMENTS	EAST TILBURY TIDAL WALL	SCALES: 1:100 NAT. & AS SHOWN
	A HEIGHT OF WALL & CREST RAISED. ACCESS RAMP ADDED AND OTHER DETAILS. J.L 23·3·77	PROPOSED RAISING OF EXISTING BANK BETWEEN N.E. CORNER OF EAST TILBURY TIP & HIGH GROUND APPROX. 300m WEST OF CHURCH	SURVEYED J.L 22.6.76
	B		DESIGNED P.H.
	C		DRAWN J.L 24·6·76
	D		CHECKED
	E		SERIAL No
	F		CONTRACT No
	G		SERVICES CHECKED
	H		



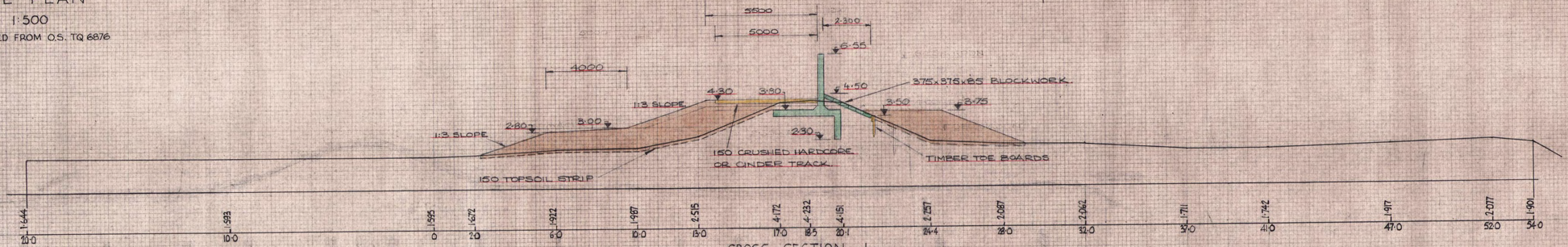
SITE PLAN

1:500

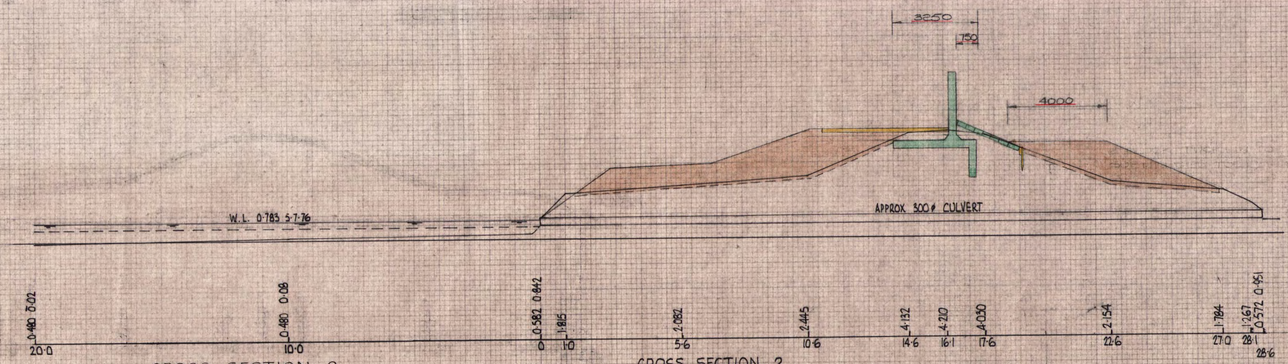
ENLARGED FROM O.S. TQ 6876



CROSS SECTION 4

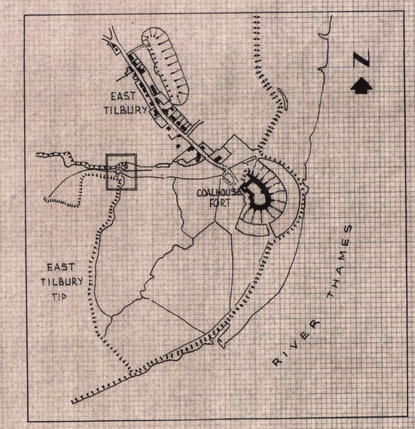


CROSS SECTION 1



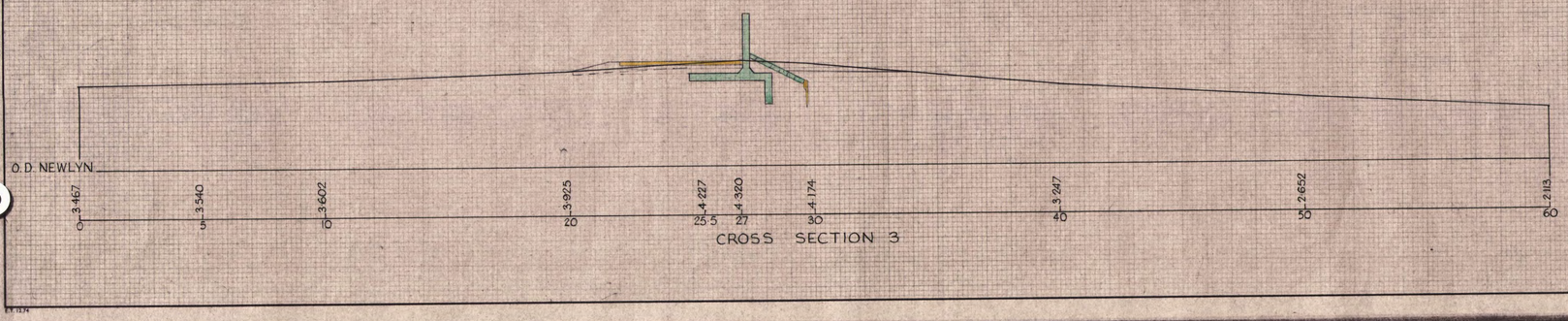
CROSS SECTION 2

CROSS SECTION 2



LOCATION PLAN

1: 10560



CROSS SECTION 3

ANGLIAN WATER AUTHORITY
ESSEX RIVER DIVISION
RECEIVED
2 5 MAY 1979

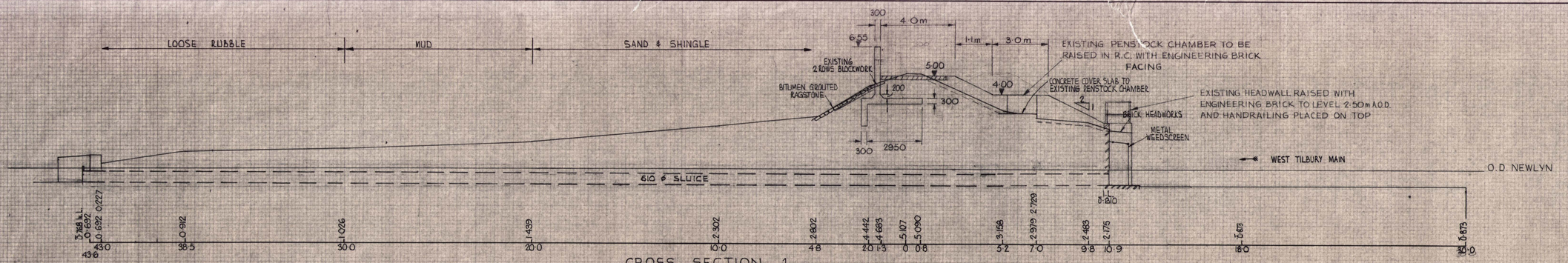
NOTES

1) TEMPORARY WORKS TO BE CONSTRUCTED FOR MAINTAINING EXISTING DEFENCE LEVEL DURING WORKS PERIOD.

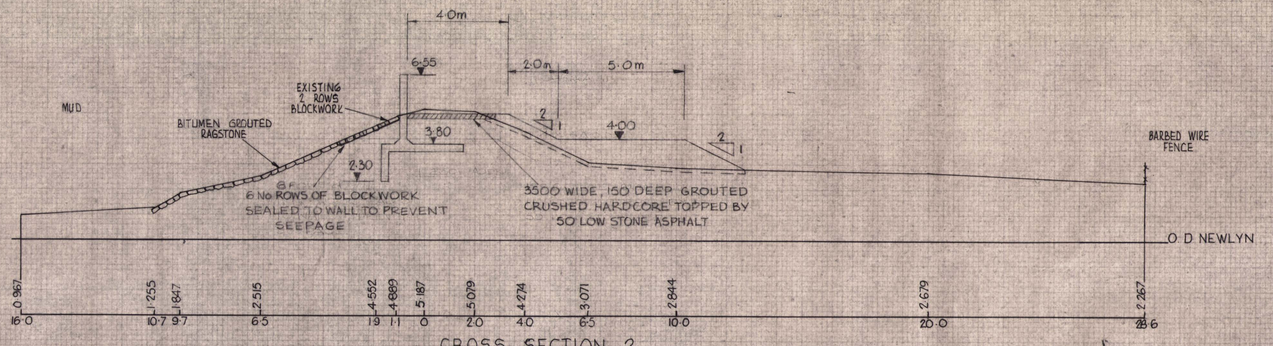
OFFICE COPY

CATCHMENT	ANGLIAN WATER AUTHORITY ESSEX RIVER DIVISION	76/3946/11B	A. Mascall DIVISIONAL ENGINEER
DWGS. FOR REFERENCE	AMENDMENTS: A HEIGHT OF WALL & CREST RAISED - ACCESS STAIRS ADDED AND OTHER DETAILS. 14.12.77; B Blockwork Dimensions C/S 18.5.78; C; D; E; F; G; H	EAST TILBURY TIDAL WALL — PROPOSED RAISING OF EXISTING BANK BETWEEN N.E. CORNER OF EAST TILBURY TIP & HIGH GROUND APPROX. 300m WEST OF CHURCH	SCALES: 1:100 NAT. & AS SHOWN
			SURVEYED J.L. 22.6.76; DESIGNED PM; DRAWN J.L. 24.6.76; CHECKED; SERIAL No.; CONTRACT No.; SERVICES CHECKED

EX 1274

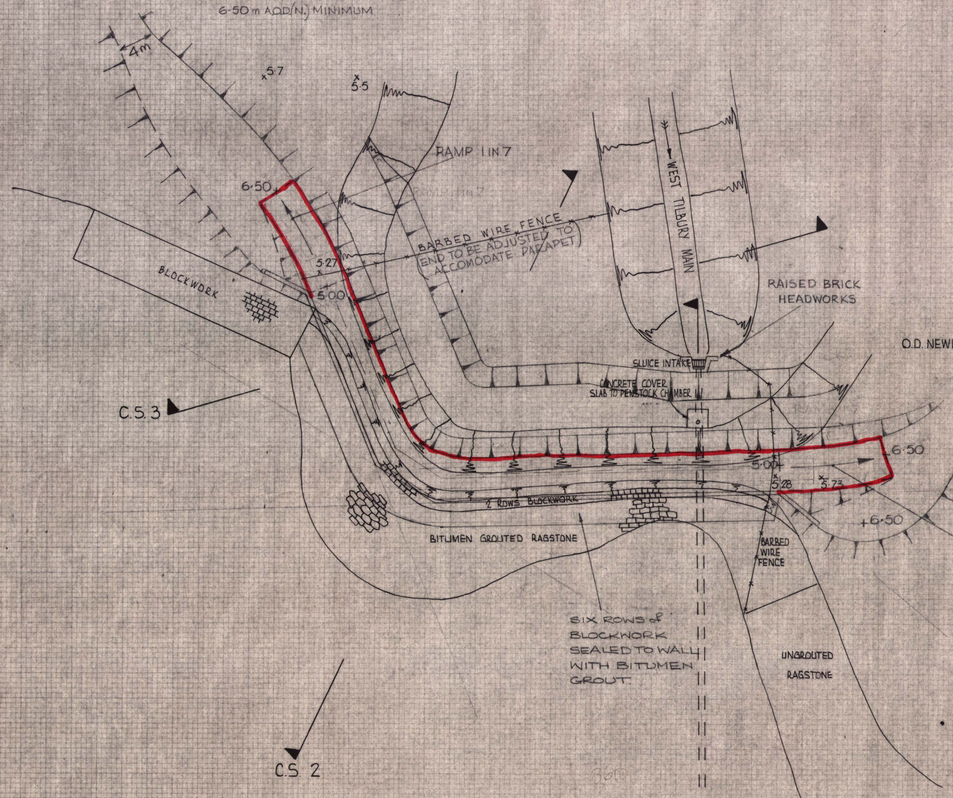


CROSS SECTION 1

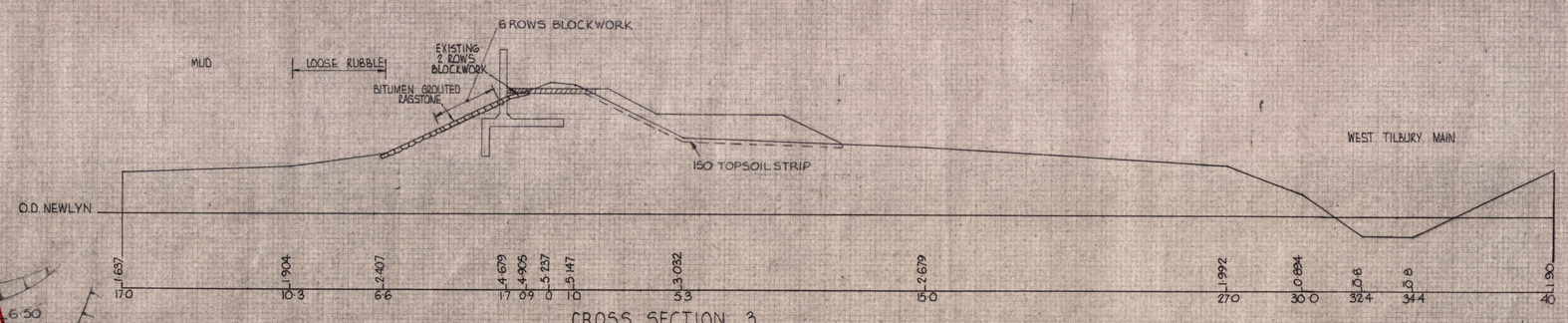


CROSS SECTION 2

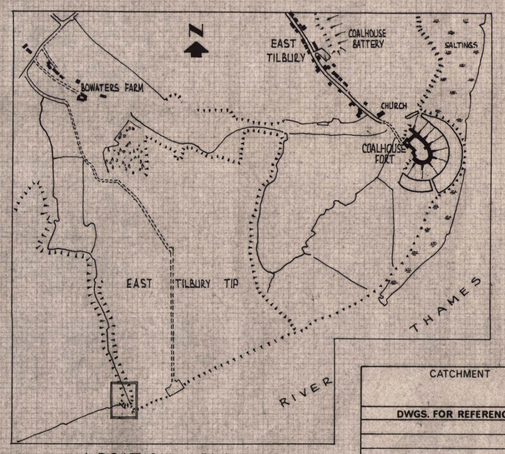
NOTE.
PARAPET TO BE SEALED BACK TO TIP AT EACH END BY REGRADING EXISTING TIP MATERIAL TO LEVEL 6.50m AOD(N) MINIMUM



SITE PLAN
1:250



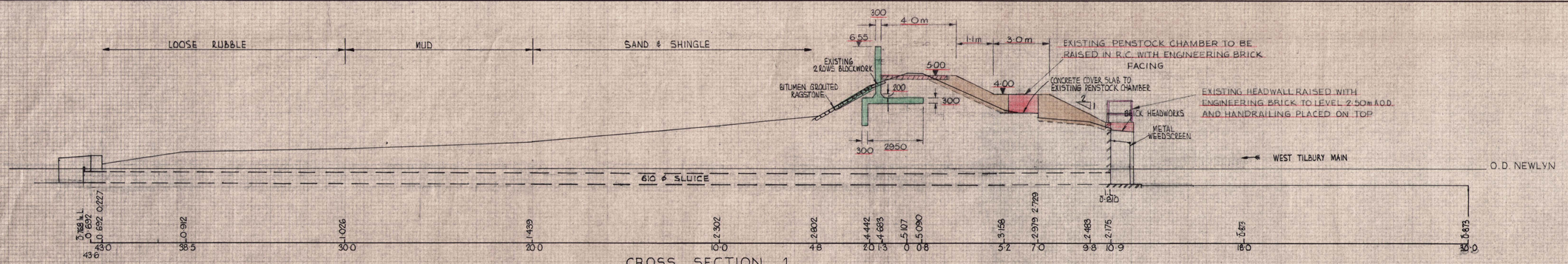
CROSS SECTION 3



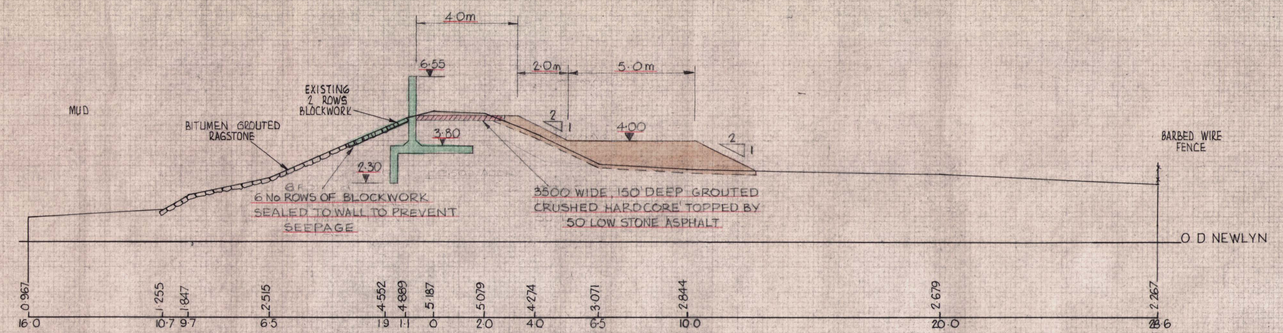
LOCATION PLAN
1:10560

NOTES
1) TEMPORARY WORKS TO BE CONSTRUCTED FOR MAINTAINING EXISTING DEFENCE LEVEL DURING WORKS PERIOD
2) LEVELS BASED ON O.B.M. ON LANDWARD HEADWORKS OF BOWATERS SLUICE - VALUE 1.511m A.O.D.(N)

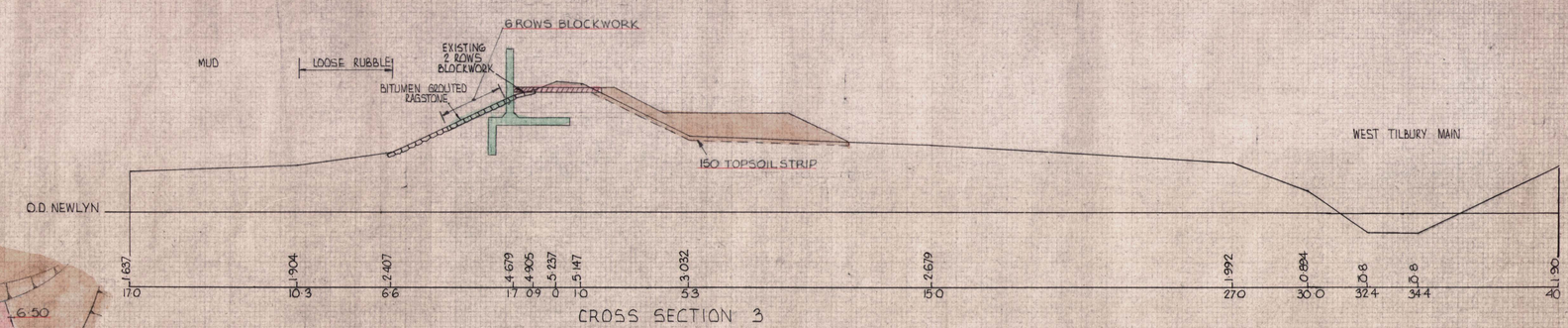
CATCHMENT	ANGLIAN WATER AUTHORITY ESSEX RIVER DIVISION	76/3946/12c	A. Mascall DIVISIONAL ENGINEER
DWGS. FOR REFERENCE	AMENDMENTS	EAST TILBURY TIDAL WALL	SCALES: 1:100 NAT & AS SHOWN
	A HEIGHT OF WALL & APPROX CREST RAISED AND OTHER DETAIL AMENDMENTS J.L. 25-8-77	PROPOSED IMPROVEMENT AT BOWATERS SLUICE	SURVEYED J.L. 22-6-76
	B END OF R.C. CANTILEVER WALL AMENDED J.L. 7-11-77	SITE PLAN AND CROSS SECTIONS	DESIGNED P.W. 25-2-77
	C REGRADED OF MATERIAL AT END OF R.C. CANTILEVER WALL MOVED TO ACCOMODATE BERM ADDED J.L. 28-10-78		DRAWN J.L.
	D		CHECKED P.W. 25-2-77
	E		SERIAL No
	F		CONTRACT No
	G		SERVICES CHECKED
	H		



CROSS SECTION 1

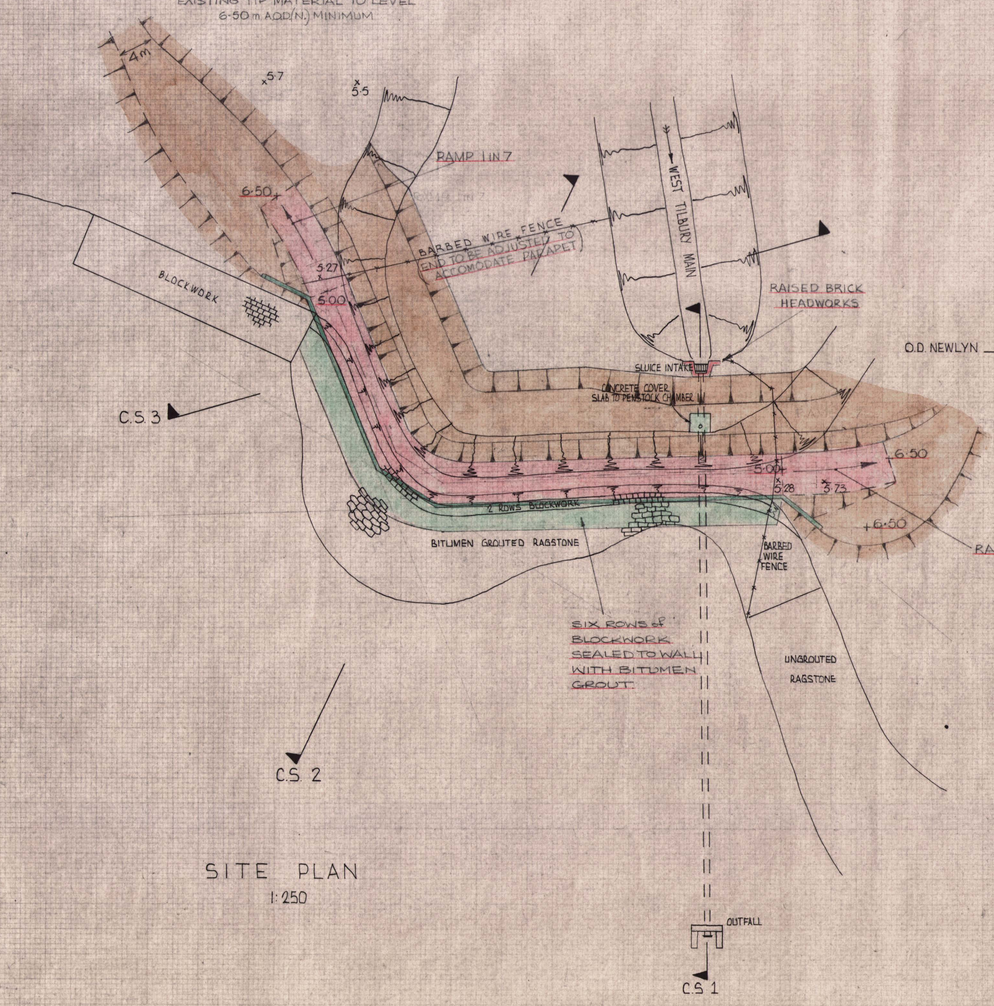


CROSS SECTION 2

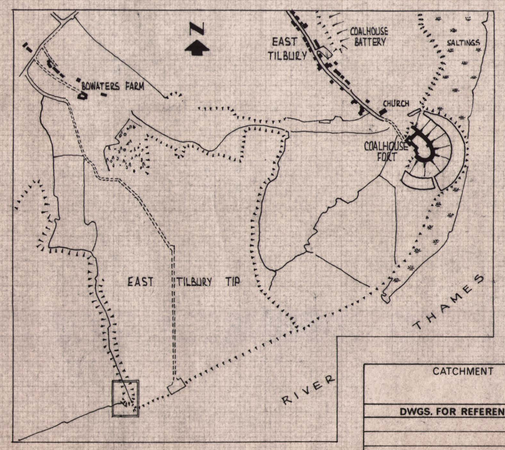


CROSS SECTION 3

NOTE.
PARAPET TO BE SEALED BACK TO TIP AT EACH END BY REGRADING EXISTING TIP MATERIAL TO LEVEL 6·50 m AOD(N.) MINIMUM.



SITE PLAN
1:250



LOCATION PLAN
1:10560

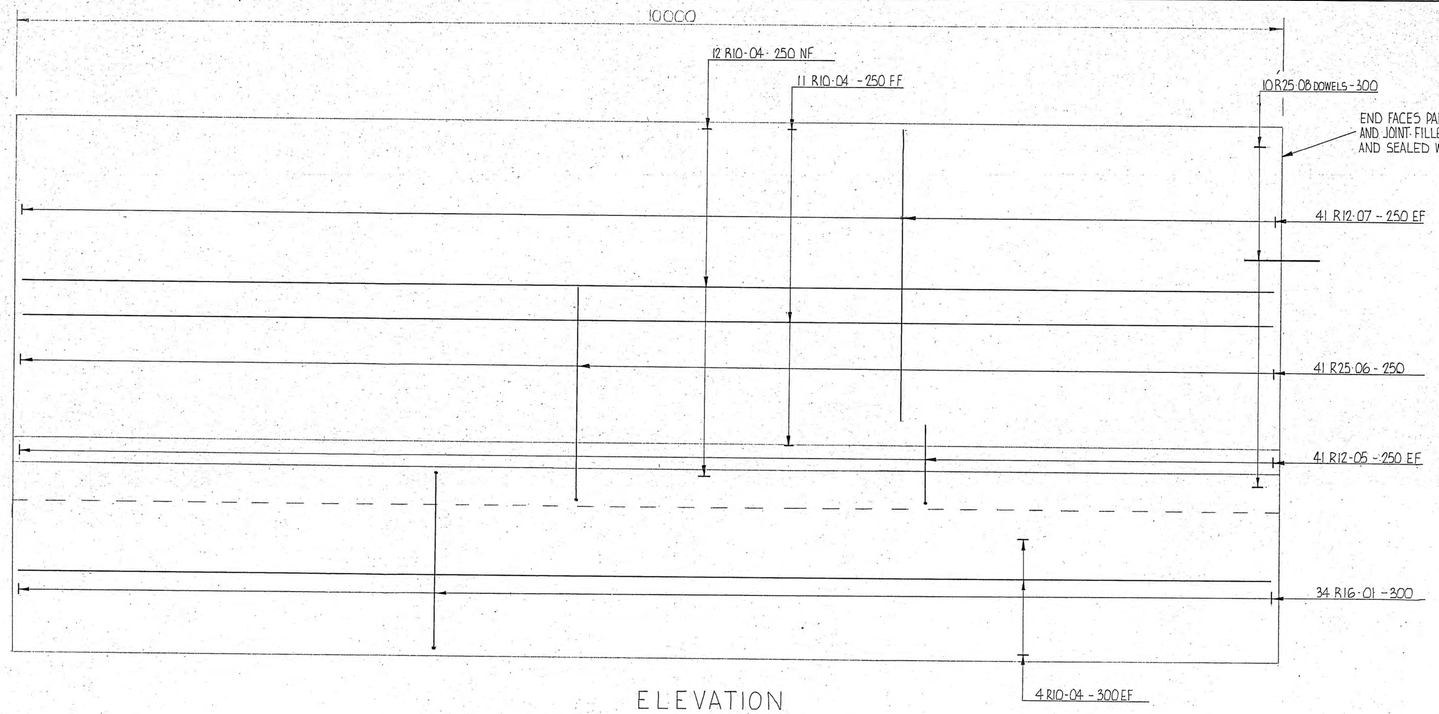
NOTES
1) TEMPORARY WORKS TO BE CONSTRUCTED FOR MAINTAINING EXISTING DEFENCE LEVEL DURING WORKS PERIOD
2) LEVELS BASED ON O.B.M. ON LANDWARD HEADWORKS OF BOWATERS SLUICE - VALUE 1·511m A.O.D.(N)

ANGLIAN WATER AUTHORITY
ESSEX RIVER DIVISION
DRAWING OFFICE
2.5 MAY 1979

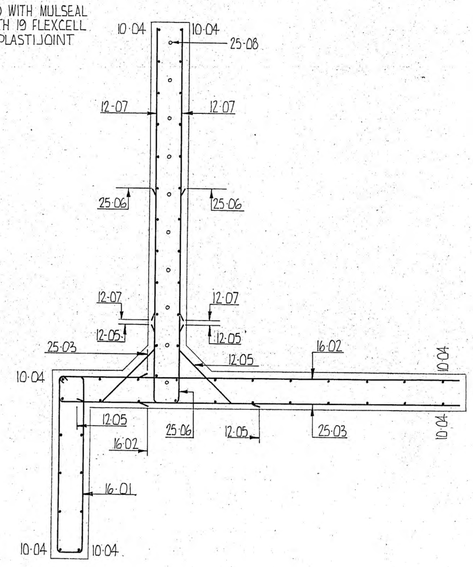
OFFICE COPY

CATCHMENT	ANGLIAN WATER AUTHORITY ESSEX RIVER DIVISION	76/3946/12c	A. Mascall DIVISIONAL ENGINEER
DWGS. FOR REFERENCE	AMENDMENTS: A WEIGHT OF WALL & APPROX. CREST RAISED AND OTHER DETAIL AMENDED 6-77; B END OF R.C. CANTILEVER WALL AMENDED & REGRADED TO MATERIAL ALTERED J.L. 1-2-77; C R.C. CANTILEVER WALL MOVED SEAWARD & BERM ADDED J.L. 28-10-78; D; E; F; G; H	EAST TILBURY TIDAL WALL PROPOSED IMPROVEMENT AT BOWATERS SLUICE SITE PLAN AND CROSS SECTIONS	SCALES: 1:100 NAT & AS SHOWN; SURVEYED J.L. 28.6.76; DESIGNED P.W. 25.2.77; DRAWN J.L.; CHECKED P.W. 28.3.77; SERIAL No.; CONTRACT No.; SERVICES CHECKED

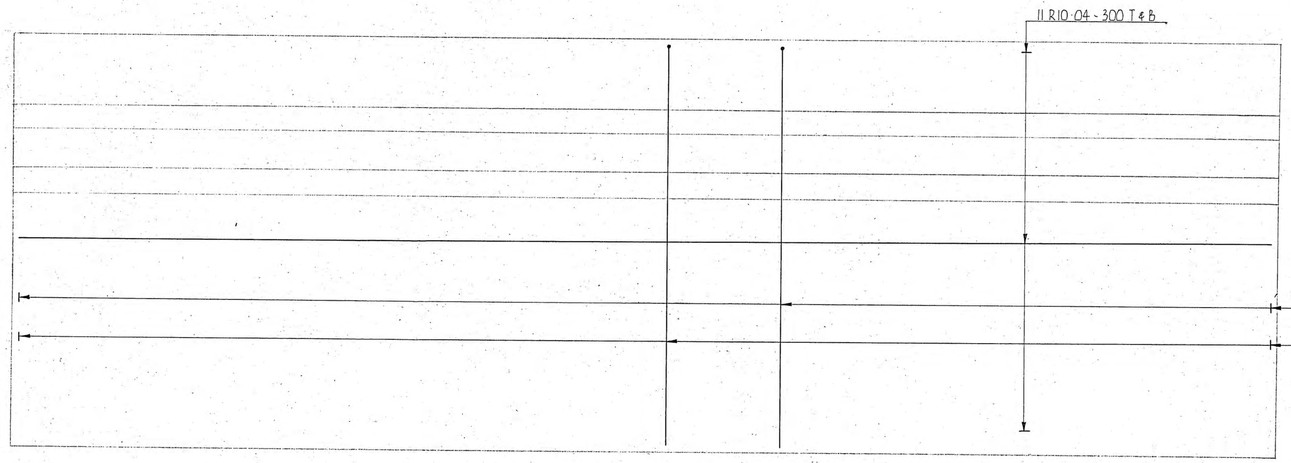
EY.1234



ELEVATION



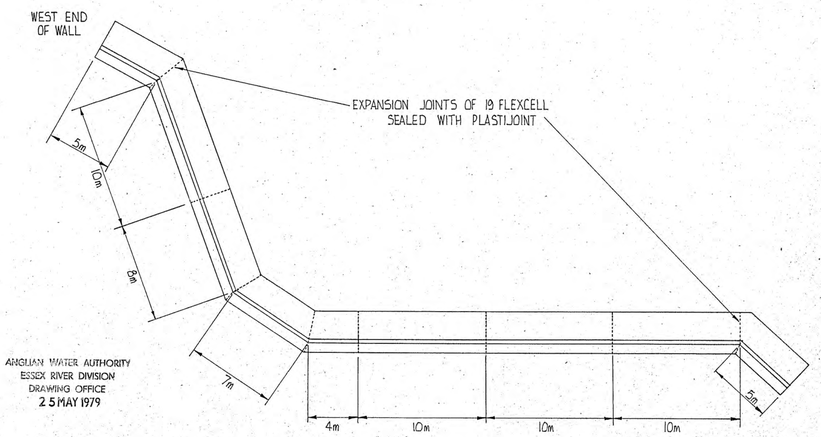
SECTION



PLAN

REINFORCEMENT DETAIL FOR ONE TYPICAL 10m LONG BAY

NOTES :
1) CONCRETE TO BE 1 : 1½ : 3
2) MINIMUM COVER TO REINFORCEMENT TO BE 50
3) BAR Mk 04 ON DRAWING CORRESPONDS WITH BAR Mks 09, 10, 11, 12 OR 13 ON BENDING SCHEDULE IN BAYS OF LESS THAN 10m LENGTH



ANGLIAN WATER AUTHORITY
ESSEX RIVER DIVISION
DRAWING OFFICE
25 MAY 1979

1:200 PLAN SHOWING ARRANGEMENT OF BAYS AT BOWATERS SLUICE

DO NOT SCALE

CATCHMENT	ANGLIAN WATER AUTHORITY ESSEX RIVER DIVISION	79/3946/14	A. Mascall DIVISIONAL ENGINEER
DWGS. FOR REFERENCE	AMENDMENTS	EAST TILBURY TIDAL WALL	SCALES: 1:20
	A	LINK WALLS AT BOWATERS SLUICE AND N.E. CORNER OF TIP (COALHOUSE FORT)	SURVEYED
	B	REINFORCEMENT DETAILS	DESIGNED PEW
	C		DRAWN JL
	D		CHECKED
	E		SERIAL No
	F		CONTRACT No
	G		SERVICES CHECKED
	H		

OFFICE COPY

E.T.1274

Annex C.12 Agreed Statements

Flood Risk Assessment - Environment Agency Agreed Statement

Site proposal and address: Lower Thames Crossing
Date: 10 October 2022

Thank you for engaging with us regarding the Flood Risk Assessment prior to your formal examination submission of the Lower Thames Crossing (LTC) Nationally Significant Infrastructure Project (NSIP).

We can confirm that we support the content in the Flood Risk Assessment and are unlikely to raise any objections to the LTC NSIP you proceed to make based on this submitted information and discussions.

This is subject to:

- The listed documents being submitted as part of the application

The below updates were sent to us following our comments set out in our comments tracker – Sep 21 v2 Oct update sent on 11 November 2021. We reviewed the following updates and provided our comments via email as referenced below.

Documents

- **6.3 Environmental Statement Appendices – Appendix 14.6 Flood Risk Assessment – Part 1 (version received July 2022) -** *email ref 'FRA comments' dated 6/7/22*
- **6.3 Environmental Statement Appendices – Appendix 14.6 Flood Risk Assessment – Part 2 (version received July 2022) -** *email ref 'FRA comments' dated 6/7/22*
- **6.3 Environmental Statement Appendices – Appendix 14.6 Flood Risk Assessment – Part 3 (version received July 2022) -** *email ref 'FRA comments' dated 6/7/22*
- **6.3 Environmental Statement Appendices – Appendix 14.6 Flood Risk Assessment – Part 4 (version received July 2022)**
- **6.3 Environmental Statement Appendices – Appendix 14.6 Flood Risk Assessment – Part 5 (version received July 2022) –** *Subject to confirmation if a revised model will be submitted for further consultation referenced in our email dated 15/9/22.*
- **6.3 Environmental Statement Appendices – Appendix 14.6 Flood Risk Assessment – Part 6 (version received July 2022) –** *email from Michael Wilson dated 18/8/22 attaching the Breach modelling: Considering TE2100 future barrier options as per our email dated 21/7/22 ref 'Response to FRA - Part 6'*

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

- **6.3 Environmental Statement Appendices – Appendix 14.6 Flood Risk Assessment – Part 7 (version received July 2022) –** *Surface Water drainage comments provided by Lead Local Flood Authority*
- **6.3 Environmental Statement Appendices – Appendix 14.6 Flood Risk Assessment – Part 10 (version received July 2022) –***email dated 7/7/22 ref 'FRA comments'*
- **Flood Hydraulic Model Mardyke (version received May 2022) –** *email dated 1/6/22 ref 'LTC CONSULTATION - Mardyke and Tilbury Main'*
- **Flood Hydraulic Model Tilbury Main (version received May 2022) -** *email dated 1/6/22 ref 'LTC CONSULTATION - Mardyke and Tilbury Main'*

Please note this response is based on the information you have made available and our best available datasets at the time of this response. It is based on current national planning policy, associated legislation and environmental data / information. If any of these elements change we may need to reconsider our position.

Yours faithfully,

[redacted]

Environment Agency

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

creating a better place

Water Framework Directive Assessment - Environment Agency Agreed Statement

Site proposal and address: Lower Thames Crossing
Date: 10 October 2022

Thank you for engaging with us regarding the Water Framework Directive Assessment prior to your formal examination submission of the Lower Thames Crossing (LTC) Nationally Significant Infrastructure Project (NSIP).

We can confirm that we support the content in the Water Framework Directive Assessment and are unlikely to raise any objections to the LTC NSIP you proceed to make based on this submitted information and discussions.

This is subject to:

- The listed documents being submitted as part of the application

Documents

- **6.3 Environmental Statement Appendices – Appendix 14.7 Water Framework Directive (version received 1 August 2022)**
- Subject to the document being updated following our comments **07: Lower Thames Crossing – Water Framework Directive Assessment Review (ref: KT/2018/125061/07-L01; dated 30 August 2022)**
  These updates were requested following our comments 07: Lower Thames Crossing - Water Framework Directive Assessment Review (ref: KT/2018/125061/07-L01; dated 30 August 2022)'. LTC provided comments and an updated document for review on 29 September 2022. This has not been reviewed before NSIP submission.)

Please note this response is based on the information you have made available and our best available datasets at the time of this response. It is based on current national planning policy, associated legislation and environmental data / information. If any of these elements change we may need to reconsider our position.

Yours faithfully,

[redacted]
Environment Agency

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

creating a better place

Hydrogeological Risk Assessment - Environment Agency Agreed Statement

Site proposal and address: Lower Thames Crossing
Date: 10 October 2022

Thank you for engaging with us regarding the Hydrogeological Risk Assessment prior to your formal examination submission of the Lower Thames Crossing (LTC) Nationally Significant Infrastructure Project (NSIP).

We can confirm that we support the content in the Hydrogeological Risk Assessment and are unlikely to raise any objections to the LTC NSIP you proceed to make based on this submitted information and discussions.

This is subject to:

- The listed documents being submitted as part of the application

Documents

- **6.3 Environmental Statement Appendices – Appendix 14.5 Hydrogeological Risk Assessment (version received 7 July 2022)**
- Subject to the document being updated as set out in **the letter from the Lower Thames Crossing Principal Hydrogeologist, National Highways, titled 'Final response to EA comments 5 Aug 2022_v2' including 'Table 1: LTC response to Environment Agency comments of 5/8/2022' (dated 12 September 2022).**
  These updates were requested following our comments '(04) Hydrogeological Risk Assessment (HyRA) finalised 07.07.2022 (ref: KT/2020/127281/05-L01; dated 5 August 2022)'. We reviewed and agreed the updates in our comments '(05) Hydrogeological Risk Assessment (HyRA) (ref: KT/2020/127281/06/L01; dated 10 October 2022)'.

Please note this response is based on the information you have made available and our best available datasets at the time of this response. It is based on current national planning policy, associated legislation and environmental data / information. If any of these elements change we may need to reconsider our position.

Yours faithfully,

[redacted]

Environment Agency

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Annex C.13 Allowing for new information since completing the DCO Application Flood Risk Assessment

national highways

Lower Thames Crossing

Allowing for new information since completing the DCO application Flood Risk Assessment

Technical Note
Status: Final

DATE: November 2023
DEADLINE: 7

Lower Thames Crossing

Allowing for new information since completing the DCO application Flood Risk Assessment

List of contents

Page number

List of plates

Page number

List of tables

Page number

Executive Summary

Since the Lower Thames Crossing (the Project) Development Consent Order (DCO) application was submitted the following new information relevant to flood risk has become available:

a. The Environment Agency (EA) has provided updated River Thames Estuary Extreme Water Level (EWL) data.

b. The EA has published a revised Thames Estuary 2100 (TE2100) Plan (EA, April 2023).

In addition to the above new information, the government's Ministerial Statement (UK Parliament, 2023) has delayed the planned completion of the Project by two years. The Project programmed completion date and Project lifetime will therefore shift by two years from 2030 and 2130 respectively to 2032 and 2132.

This technical note considers the implications of the new information, and the two-year delay, on the conclusions, Flood Risk Assessment (FRA) which was submitted in support of the DCO Application as follows:

a. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 1 [**APP-460**]

b. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 2 [**APP-461**]

c. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 3 [**APP-462**]

d. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 4 [**APP-463**]

e. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 5 [**APP-464**]

f. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 6 [**REP1-171**]

g. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 7 [**APP-466**]

h. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 8 [**APP-467**]

i. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 9 [**APP-468 - APP-476**]

j. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 10 [**APP-477**]

This review is presented in Table 2.1 and, where further clarification is required, detailed analysis is presented in Section 2.3.

This technical note concludes that the new information and the planned two-year delay in completion of the Project, do not have a significant impact on the conclusions of the FRA submitted with the DCO application.

1 Introduction

1.1.1 Since the Lower Thames Crossing (the Project) Development Consent Order (DCO) application was submitted the following new information relevant to flood risk has become available:

a. The Environment Agency (EA) has provided updated River Thames Estuary Extreme Water Level (EWL) data.

b. The EA has published a revised Thames Estuary 2100 (TE2100) Plan (EA, April 2023).

1.1.2 In addition to the above new information, the government's Ministerial Statement (UK Parliament, 2023) has delayed the planned completion of the Project by two years. The Project programmed completion date and Project lifetime will therefore shift by two years from 2030 and 2130 respectively to 2032 and 2132.

1.1.3 This technical note considers the implications of the new information, and the two-year delay, on the conclusions, Flood Risk Assessment (FRA) which was submitted in support of the DCO Application as follows:

k. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 1 [**APP-460**]

l. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 2 [**APP-461**]

m. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 3 [**APP-462**]

n. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 4 [**APP-463**]

o. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 5 [**APP-464**]

p. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 6 [**REP1-171**]

q. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 7 [**APP-466**]

r. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 8 [**APP-467**]

s. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 9 [**APP-468 - APP-476**]

t. Environmental Statement - Appendix 14.6 - Flood Risk Assessment - Part 10 [**APP-477**]

1.2 Report Structure

1.2.1 The report is structured as follows:

a. Section 2 considers the updated EWL dataset, and the two-year delay in planned completion of the Project.

b. Section 3 considers the revised TE2100 Plan.

c. Conclusions are summarised in Section 4.

2 Extreme Water Levels (EWL)

2.1 The updated EWL dataset

2.1.1 The EA has provided the updated tidal River Thames EWL dataset for use in the Project's Coalhouse Point wetland flood risk assessment modelling.

2.1.2 The dataset provided includes modelled EWL for locations in the tidal River Thames for a range of climate epochs (ranging from 2020 epoch to 2170 epoch), for various climate change scenarios ("M", "H" and "HPP"). The EA has confirmed that:

a. EWL have been provided for two potential future Thames barrier upgrade options: (i) improvements at the current Thames barrier location; and (ii) a new barrier at the "Long Reach" location.

b. The "H" and "HPP" climate change scenarios equate to the Representative Concentration Pathway 8.5 (as defined in Met Office, 2018) 95th percentile and H++ climate change scenarios respectively. These climate change scenarios are equivalent to the Upper end scenario and H++ scenario applied in the DCO application FRA, and specified in Flood risk assessments: climate change allowances (Environment Agency, 2022).

2.1.3 Plate 2.1 tabulates EWL values applied in the DCO application FRA modelling and those in the updated EWL dataset (for a future Thames barrier at the existing Thames barrier location) and their differences. Plate 2.2 compares EWL values applied in the DCO application FRA modelling with those in the updated EWL dataset for a future Thames barrier at Long Reach.

2.1.4 The DCO application FRA EWL in Plate 2.1 are specified for 2030 and 2130, as these were applied in the assessment. The updated EWL in Plate 2.1 and Plate 2.2 are specified for 2032 and 2132, as this accounts for the two-year shift in the Project's programmed completion date and Project lifetime (Section 0).

2.1.5 Where the differences in EWL tabulated in Plate 2.1 and Plate 2.2 show higher EWL values for the updated EWL dataset, these are highlighted with blue shading. The "greyed out" text entries in Plate 2.1 and Plate 2.2 are for tidal events that are not applied in the DCO application FRA modelling simulations (i.e. the design tidal conditions are not required in the DCO application FRA modelling design simulations), and the in-progress Coalhouse Point wetland modelling.

2.1.6 The potential impact of the updated EWL on conclusions drawn from the DCO application FRA modelling is considered in Section 2.2 and Section 2.3.

Plate 2.1 Comparison of EWL values applied in the DCO application FRA modelling with those in the updated EWL dataset for future Thames barrier at the existing Thames barrier location

EWLs aplied in DCO application FRA modelling (Upper end sea level rise allowances)

		Extreme Water Level (EWL) values (mAOD) for return periods (years)							
		2030 Upper end				2130 Upper end			
Location	TE2100 model node	2	5	200	1000	2	5	200	1000
Mardyke breach and downstream boundary of fluvial	3.15	Not available	5.005	5.693	6.067	Not available	6.005	6.723	7.079
Breach TIL005	3.26		4.815	5.503	5.877		5.817	6.533	6.890
Breach TIL006 (Bowaters Sluice) and Coalhouse Point	3.28		4.675	5.363	5.737		5.764	6.473	6.834

Updated TE2100 EWLs (TE2100 "H" sea level rise allowances)

		Extreme Water Level (EWL) values (mAOD) for return periods (years)							
		2032 "H" (interpolated between 2020 and 2040)				2132 "H" (interpolated between 2120 and 2135)			
Location	TE2100 model node	2	5	200	1000	2	5	200	1000
Mardyke breach and downstream boundary of fluvial	3.15u	4.91	5.06	5.65	5.98	6.33	6.47	6.94	7.16
Breach TIL005	3.26	4.55	4.70	5.35	5.68	5.98	6.13	6.66	6.94
Breach TIL006 (Bowaters Sluice)	3.27i	4.49	4.64	5.29	5.61	5.92	6.07	6.62	6.90
Coalhouse Point	3.28	4.47	4.62	5.26	5.59	5.90	6.05	6.60	6.89

Difference between updated TE2100 EWLs and EWLs applied in DCO application FRA modelling (m)

		Difference between updated EWLs and EWLs applied in DCO application FRA modelling (m) for return periods (years)							
		Updated EWLs 2032 "H" minus DCO FRA Upper end 2030				Updated EWLs 2132 "H" minus DCO FRA Upper end 2130			
Location	TE2100 model node	2	5	200	1000	2	5	200	1000
Mardyke breach and downstream boundary of fluvial	3.15u	Not available	0.05	-0.04	-0.09	Not available	0.47	0.22	0.08
Breach TIL005	3.26		-0.12	-0.15	-0.20		0.31	0.13	0.05
Breach TIL006 (Bowaters Sluice)	3.27i		-0.04	-0.07	-0.13		0.31	0.15	0.06
Coalhouse Point	3.28		-0.05	-0.10	-0.15		0.29	0.13	0.05

Plate 2.2 Comparison of EWL values applied in the DCO application FRA modelling with those in the updated EWL dataset for future Thames barrier at Long Reach

		Updated EWLs (mAOD) for return periods (years). Long Reach barrier option "H" 2132 (interpolated between 2120 and 2135). (mAOD)				Difference (m) Updated EWLs (Long Reach barrier option "H", 2132) minus EWLs applied in DCO application FRA modelling (Upper end, 2130) for return periods (years)			
Location	**TE2100 model node**	**2**	**5**	**200**	**1000**	**2**	**5**	**200**	**1000**
Mardyke breach and downstream boundary of fluvial	3.15u	1.09	1.53	2.89	3.67	Not available	-4.48	-3.83	-3.41
Breach TIL005	3.26	6.11	6.28	6.87	7.11		0.46	0.34	0.22
Breach TIL006 (Bowaters Sluice)	3.27i	6.04	6.20	6.82	7.06		0.44	0.35	0.23
Coalhouse Point	3.28	6.03	6.19	6.80	7.05		0.43	0.33	0.22

2.2 Impact of the updated EWL on the DCO application FRA conclusions

2.2.1 In order to provide comfort, analysis has been undertaken applying updated EWL in the DCO application FRA modelling assessment to show whether there is a potential to change the conclusions drawn from the modelling.

2.2.2 Table 2.1 lists aspects of the DCO application FRA modelling and a consideration of the potential impact of applying the updated EWL on conclusions drawn from the FRA modelling. Table 2.1 also considers whether further analysis is required to account for the updated EWL in the FRA.

Table 2.1 Potential impact of updated EWL on modelling conclusions

Assessment aspect	Potential impact of updated EWL on modelling conclusions	Further analysis required?
Mardyke fluvial modelling	The DCO application FRA Mardyke fluvial modelling was found to be insensitive to downstream tidal EWL. The Mardyke fluvial modelling applied a five-year return period tidal EWL when simulating the 1,000-year return period fluvial event (during which the Project road is required to remain operational), and mean high water springs (MHWS) condition for the 100 year return period fluvial event (relevant for assessing flood risk impacts elsewhere and mitigation). While the updated five-year return tidal EWL applied during the 1,000-year return period fluvial event in 2132 is 0.47m higher than that applied in the FRA modelling, the Project road levels in the Mardyke floodplain were dictated by factors other than fluvial flood levels such that the Project road level would be more than 5m above the simulated 1,000-year return period flood level in 2130. Applying the higher EWL in the modelling would therefore not change the conclusion that the Project road would remain operational during the 1,000-year return period flood event in 2130 (and in 2132). The updated EWL do not change the MHWS values applied in the FRA modelling, and therefore would not change the assessment of flood risk impacts elsewhere, or mitigation requirements.	None

Assessment aspect	Potential impact of updated EWL on modelling conclusions	Further analysis required?
Mardyke breach modelling	The FRA modelling simulated a breach at Mardyke Sluice during the 1,000-year return period tidal event in 2130. Results indicated breach flooding remains in-channel at the Project road location and so the Project road would not be affected by a breach, and would not impact on breach flood risk elsewhere. The updated EWL is only 0.08m higher (in 2132) and so it is considered that applying the updated EWL would not change the FRA conclusions.	None
Tilbury Main fluvial modelling	The updated EWL are not significant for the Tilbury Main fluvial modelling as the "sluice blocked" modelling simplification results in no tidal influence on model results.	None
Tilbury Main breach modelling Breach west of project (TIL005) Bowater Sluice breach modelling (TIL006)	The FRA modelling includes an assessment of the impact of a breach on the Project road (during the 1,000-year return period tidal event in 2130), and the impact of the Project on flood risk elsewhere during a breach (during the 200-year return period tidal event in 2030 and 2130). **Breach during 1,000-year return period event** The updated EWL are 0.05m and 0.06m higher (in 2132) at breach locations TIL005 (former power station site) and TIL006 (Bowaters Sluice) respectively than those applied in the assessment for the 1,000-year return period event in 2130 (with Upper end sea level rise allowances applied). This difference is considered insignificant as: • The Project road is designed to remain operational during a 1,000-year return period flood in 2130 based on a projection of River Thames design levels to the Project site i.e. the flood level during a simulated breach event is significantly lower than the design flood level applied • A slightly higher EWL applied for the breach event simulations would therefore not impact the Project road operation **Breach during 200-year return period event** The updated EWL are (with Upper end sea level rise allowances applied): • 0.15m and 0.07m lower at breach locations TIL005 and TIL006 respectively (in 2032) than those applied in the assessment for the 200-year return period event in 2030 • 0.13m and 0.15m higher (in 2132) at breach locations TIL005 and TIL006 respectively than those applied in the DCO application FRA	**Breach during 1,000-year return period event** No further model results required. **Breach during 200-year return period event** Consider breaches at TIL005 and TIL006 locations during the 200-year return period River Thames EWL in 2132, for the pre- and post-development cases to review assessed offsite impacts during a breach of River Thames tidal flood defences. This is discussed further in Section 2.3.

Assessment aspect	Potential impact of updated EWL on modelling conclusions	Further analysis required?
	assessment for the 200-year return period event in 2130 Applying the higher 200-year return period EWL in 2132 (compared to the 2130 EWL applied in the DCO application FRA modelling) has potential to affect the assessed impacts of the Project road on flooding during a breach of River Thames tidal flood defences.	
North Portal standard of protection	The North Portal flood protection design level is specified as the 1,000-year return period River Thames EWL in 2130 with an uncertainty allowance added (+1.0m). **Design level** The updated EWL (in 2132) are 0.06m higher than those applied in the assessment for the 1,000-year return period event in 2130 (with Upper end sea level rise allowances applied). Applying the same uncertainty allowance (+1.0m) would require an increase in design level for the North Portal flood protection of 0.06m, which is within the vertical limit of deviation of 0.5m. No further analysis is therefore required. **Credible maximum climate change level (H++ sea level rise allowances)** For the H++ scenario the updated EWL in 2132 are 0.76m higher than those applied in the assessment (8.04mAOD compared to 7.28mAOD). The North Portal flood defences and surrounding infrastructure could be adapted, if required, to account for future change, which may be triggered for example by a requirement to provide a higher standard of protection to the H++ EWL. This is demonstrated through a sensitivity check presented in technical note reference: HE540039-CJV-EFR-GEN-TNT-ENV-00022.	None
TE2100 future barrier options	The DCO application FRA considered the impact of the proposed scheme on flood risk elsewhere following a breach of the River Thames tidal defences during the tidal design event (200-year return period) in 2030 and 2130. The DCO application FRA breach assessment is based on the current Thames barrier arrangement. The DCO application FRA also considered the potential impacts of alternative future Thames barrier options on the FRA breach assessment, for two alternative future barrier options specified by the EA (new barrier at Long Reach and new barrier at Gravesend), and concluded the DCO application FRA breach modelling was robust with regard to	Consider offsite impacts following breaches at TIL005 and TIL006 locations during the 200-year return period River Thames EWL in 2132, for the Long Reach future barrier option. See Section 2.3.

Assessment aspect	Potential impact of updated EWL on modelling conclusions	Further analysis required?
	potential alternative Thames barrier options (i.e. considering the alternative options does not impact the DCO application FRA conclusions). Updated EWL have been provided for future barrier options at the existing Thames barrier location and at Long Reach, but not for the Gravesend future barrier option, or for options including floodplain storage. The Environment Agency has confirmed that updated EWL are not available for the Gravesend future barrier option, or options with floodplain storage. However, previously the Gravesend barrier option EWL were lower than other barrier options, and options with storage would have lower EWL than options without storage. The updated EWL provided are therefore considered to represent the worst case. The different EWL of the various barrier options may require different design defence levels. These have not been provided by the Environment Agency. ***Potential impact on FRA breach assessment (impacts on flood risk elsewhere):*** Compared to the EWL applied in the DCO application FRA breach modelling (2130), the 200-year return period updated EWL in 2132 for the Long Reach barrier option are 0.34m and 0.35m higher for the TIL005 and TIL006 breach locations respectively (and 0.24m and 0.23m higher than the equivalent updated EWL with the future barrier at the existing Thames barrier location). For the previous version of EWL applied in the DCO application FRA, the maximum increase in 200-year return period EWL (compared to a barrier at the existing Thames barrier location) for alternative future barrier options considered was 0.03m. It was therefore concluded that a modelled assessment would not be required. The updated EWL for the Long Reach future Thames barrier option are higher than for the current Thames barrier location, and higher than applied in the DCO application FRA modelling (by 0.34m and 0.35m higher for the TIL005 and TIL006 breach locations respectively).	
Coalhouse Point wetland area	The Coalhouse Point wetland area modelling is in progress and will apply the updated EWL. The updated EWL (2032 and 2132) will be applied within the ongoing Coalhouse Point wetland area modelling programme.	None (the modelling is currently in progress to progress SoCG item 2.1.35 [**REP1-059**]).

2.3 Further analysis

Introduction

2.3.1 The only further analysis identified as necessary in Table 2.1 relates to the offsite impacts following breaches at TIL005 and TIL006 locations during the 200-year return period River Thames EWL in 2132, applying the updated EWL. This is identified Table 2.1 for the future Thames barrier options at the current Thames barrier location and at Long Reach. As the 200-year return period River Thames updated EWL in 2132 are higher for the Long Reach barrier option (Table 2.1) assessing the Long Reach barrier option only is therefore considered sufficient, as this is the worst case.

2.3.2 The 200-year return period River Thames updated EWL in 2132 applicable for the TIL005 and TIL006 breach locations are 6.87 mAOD and 6.82 mAOD respectively, for the Long Reach barrier option. These EWL are slightly lower than the DCO application FRA modelling 1,000-year return period EWL in 2130, which are 6.89 mAOD and 6.83 mAOD respectively. Breach modelling for these slightly higher EWL has already been undertaken as part of the DCO application FRA modelling. These results (DCO application FRA modelling 1,000-year return period EWL in 2130) are considered to provide an equivalent, and conservative, assessment of the 200-year return period River Thames updated EWLs in 2132 for the TIL005 and TIL006 breach locations, for the Long Reach barrier option, and hence are used here to meet the further analysis requirement.

Analysis of breach at TIL005 location

2.3.3 Figure 1 shows differences between pre- and post-development flood depths following a breach at TIL005 location during the 1,000-year return period River Thames EWL in 2130, applying the DCO application FRA EWL and model results. Figure 2 shows differences between pre- and post-development flood hazard categories for the same simulation.

2.3.4 Figure 1 shows that the Project would result in floodplain volume displacement with an increase in flood depths of approximately 0.01m to 0.03m on the western side adjacent to the Project road. The areas shown with an increase in flood depth in Figure 1 are all low vulnerability (undeveloped land), located between the Project road and Tilbury to the west, except for part of Tilbury urban area directly west of Fort Road (this is not the case for the DCO application FRA modelled breach event during a 200-year return period EWL).

2.3.5 Figure 1 shows localised increases in flood depth at low points along Fort Road, which is above the simulated breach flood level for most of its length. Figure 1 also shows an increase in flood depths along Tilbury Loop railway (0.09m to 0.35m), however for the pre-development case the railway would be impassable during a breach (with flood depths up to approximately 1m to 2m at some locations).

2.3.6 Figure 2 shows an increase in hazard categories in some scattered areas on the western side of the Project road. The areas showing an increase in flood hazard category are all low vulnerability (undeveloped land), located between

the Project road and Tilbury to the west, except for the same part of Tilbury urban area directly west of Fort Road referred to in paragraph 2.3.4 above.

2.3.7 Figure 2 shows localised increases in flood hazard category at low points along, and adjacent to, Fort Road, which is above the simulated breach flood level for most of its length. Figure 2 also shows isolated pixels with an increase in flood hazard category along Tilbury Loop railway, however for the pre-development case the railway would be impassable during a breach (with flood hazard category 'Danger for most' along most of its length within the breach flood extent).

2.3.8 Simulated peak flood depths in the Tilbury urban area with impacts are shown for the pre- and post-development cases in Figures 3 and 4 respectively (following a breach at TIL005 location during the 1,000-year return period River Thames EWL in 2130, applying the DCO application FRA EWL and model results). Figures 5 and 6 show simulated hazard categories for the same simulated events as Figures 3 and 4 respectively.

2.3.9 For both the pre- and post-development cases peak flood depths in the Tilbury urban area with impacts are mostly in the range 0.1m to 0.5m. Simulated peak flood depths for the post-development case are approximately 0.03m higher than the pre-development case in the Tilbury urban area with impacts. This increase is seen in Figures 3 and 4 as an increase in plotted depth class for some pixels for the post-development case (compared to the pre-development case).

2.3.10 For both the pre- and post-development cases, Figures 5 and 6 show peak flood hazard categories in the Tilbury urban area with impacts are mostly categories 1 (Very low hazard) and 2 (Danger for some), with smaller areas showing category 3 (Danger for most). The increase in flood depths for the post-development case results in an increase in flood hazard category (compared to the pre-development case), by one category, for some pixels in the Tilbury urban area with impacts, as shown in Figure 2.

2.3.11 A summary of peak flood depths and hazard categories in the Tilbury urban area with impacts is presented in Table 2.2.

Table 2.2 Summary of peak flood depths and hazard categories in the Tilbury urban area with impacts

Parameter	Pre-development	Post-development	Difference (Post-development minus pre-development)
Maximum flood depth (m)	Mostly in the range 0.1m to 0.5m	Mostly in the range 0.1m to 0.5m	Approximately 0.03m
Maximum flood hazard category	Mostly categories 1 (Very low hazard) and 2 (Danger for some), with smaller areas of category 3 (Danger for most)	Mostly categories 1 (Very low hazard) and 2 (Danger for some), with smaller areas of category 3 (Danger for most)	Mostly no change in hazard category, some localised increases by one category

2.3.12 While the model results show that there are impacts in Tilbury urban area, the impacts are considered low (increase in simulated peak flood depth in this area by only 0.03m, with a resulting increase in simulated hazard score category for some pixels). Furthermore, this residual risk is very unlikely to be realised within the Project's lifetime as:

a. The impacts require an extreme River Thames flood condition to occur as well as failure of the River Thames flood defences at the TIL005 modelled breach location (near former power station), which are monitored and maintained (subject to funding availability) to reduce the risk of failure in accordance with the Environment Agency's Thames Estuary 2100 (TE2100) programme.

b. The modelling shows impacts in Tilbury urban area only for events exceeding the 200-year return period EWL assessed in the DCO application breach modelling, i.e. for EWL values exceeding 6.53 mAOD. For the updated EWL with the Long Reach future Thames barrier option considered here, the 200-year return period EWL would not exceed 6.53 mAOD until 2113 (based on interpolation of the 2100 and 2120 updated EWL values). The potential for the design breach event to impact Tilbury urban area would therefore only be after 2113, i.e. during the final 19 years of the Project lifetime (and after 2126, i.e. during the final six years of the Project lifetime for the future Thames barrier option at the current Thames barrier location).

2.3.13 The impact of the Project on residual risk in Tilbury urban area is therefore considered to be not significant.

2.3.14 Overall, applying the revised EWL and allowing for the two-year delay in planned completion of the Project, does not result in a significant change in the assessed residual risk associated with a breach of the River Thames flood defences at TIL005 location compared to the DCO application FRA (i.e. insignificant increase in residual risk for properties, and no significant change to flood risk along Fort Road and Tilbury Loop railway).

2.3.15 Allowing for the revised EWL and the two-year delay in planned completion of the Project is therefore considered to have an insignificant impact on the DCO application FRA conclusions, with regard to the residual risk associated with a breach of the River Thames flood defences at TIL005 location.

Breach at TIL006 location

2.3.16 Figure 7 shows differences between pre- and post-development flood depths following a breach at TIL006 location during the 1,000-year return period River Thames EWL in 2130, applying the DCO application FRA EWL and model results. Figure 8 shows differences between pre- and post-development flood hazard categories for the same simulation.

2.3.17 Figure 7 shows that the Project would result in reduced conveyance of breach flows from east to west across the Project road, and floodplain volume displacement, with an increase in flood depths on (i) the eastern side of the

Project road of higher than 1m for the floodplain constrained by the proposed embankment on the west (the highest increase on the eastern side of the road is approximately 3.5m, typical values are approximately 2.0m to 2.5m), (ii) Star Dam defence on the east and the surrounding hilly areas, and (iii) an increase of typically 0.2m to 0.5m (with some locally higher values up to 0.7m) east of Star Dam. Figure 7 also shows a significant reduction in flood depths on the western side of the Project road including in the Tilbury urban area by approximately 0.20m to 1m. The areas with an increase in flood depth are all low vulnerability (undeveloped land).

2.3.18 The difference (post-development minus pre-development) in hazard score category in Figure 8 shows that the Project would result in an increase in hazard category in some areas on the eastern side of the Project road by 1 to 4 categories. The highest increases are where the post-development flood extents increase beyond the pre-development flood extents. Figure 8 also shows a reduction on the western side of the road, with a reduction in Tilbury urban area by 1 to 3 categories, with the largest reductions generally at locations that are outside of the post-development breach flood extent, but inside the pre-development extent. The areas with an increase in hazard category are all low vulnerability (undeveloped land). Overall, the impact of the Project on flood risk elsewhere following a breach at TIL006 is an increase in hazard score category for areas of undeveloped land, while showing a clear benefit (reduction in flood hazard category) in Tilbury urban area, where vulnerable receptors are located (i.e. properties). Some of the impacted areas of undeveloped land will be on land for which National Highways will be seeking permanent acquisition, and some will be on third-party land.

2.3.19 It is noted that this risk is very unlikely to be realised within the Project's lifetime as it requires an extreme River Thames flood condition to occur as well as failure of the River Thames flood defences, which are monitored and maintained (subject to funding availability) to reduce the risk of failure in accordance with the Environment Agency's Thames Estuary 2100 (TE2100) programme, at the TIL006 modelled breach location (Bowaters Sluice).

2.3.20 Overall, applying the revised EWL and allowing for the two-year delay in planned completion of the Project, does not result in a qualitative change in the assessed residual risk associated with a breach of the River Thames flood defences at TIL006 location compared to the DCO application FRA (i.e. benefits in Tilbury urban area and localised increases in flood depths on undeveloped land on the eastern side of the Project road).

2.3.21 Allowing for the revised EWL and the two-year delay in planned completion of the Project is therefore considered to have an insignificant impact on the DCO application FRA conclusions, with regard to the residual risk associated with a breach of the River Thames flood defences at TIL006 location.

3 Revised TE2100 Plan

3.1 Impact of the revised TE2100 Plan on the DCO application FRA conclusions

3.1.1 The EA has published a revised TE2100 Plan. Items in the revised TE2100 Plan considered relevant for the DCO application FRA, and their suggested resolution, are listed in Table 3.1.

Table 3.1 Relevant items in the revised TE2100 Plan

Issue	National Highways' Consideration
Coalhouse Point wetland area was outside of the previous version of the TE2100 Plan policy units, but now lies within the Purfleet, Grays and Tilbury policy unit, with policy choice P4 (*"take further action to keep up with climate and land use change so that flood risk does not increase"*).	The Environment Agency has confirmed (during meeting dated 20 June 2023) that inclusion of the Coalhouse Point wetland area in the TE2100 Plan policy units is a publishing mistake, and the policy unit boundaries will be re-issued such that the Coalhouse Point wetland area remains outside of the TE2100 Plan policy units.
The DCO application FRA breach assessment is based on the current Thames barrier arrangement. The DCO application FRA also considered the potential impacts of alternative future Thames barrier options on the FRA breach assessment, for two alternative future barrier options specified by the EA (new barrier at Long Reach and new barrier at Gravesend). The revised TE2100 Plan future barrier options (and the updated TE2100 EWL dataset) may affect this assessment.	The significance of the updated EWL dataset is considered in Section 2, including consideration of the future Thames barrier options in the revised TE2100 plan.

4 Conclusions

4.1 Conclusions

4.1.1 Since the DCO application FRA was completed, the Environment Agency's Thames estuary EWL have been updated and the revised TE2100 Plan has been published. Additionally, the planned completion date of the Project has been delayed by two years.

4.1.2 This technical note considers the potential for these changes to impact the DCO application FRA conclusions.

Updated EWLs and two-year delay in planned Project completion

4.1.3 The only further analysis required to account for the updated EWL and two-year delay in planned Project completion was the requirement to consider offsite impacts following breaches at TIL005 and TIL006 locations (i.e. residual risk) during the 200 year return period River Thames EWL in 2132, applying the updated EWL (and allowing for future Thames barrier options in the revised TE2100 plan). This analysis has been completed and is reported in Section 2.3 of this document.

4.1.4 Taking the additional analysis into account, allowing for the revised EWL and the two-year delay in planned completion of the Project is considered to have an insignificant impact on the DCO application FRA conclusions, with regard to the residual risk associated with a breach of the River Thames flood defences at TIL005 and TIL006 simulated breach locations.

4.1.5 Therefore, the updated EWL and two-year delay in planned Project completion do not have a significant impact on the DCO application FRA conclusions.

Revised TE2100 Plan

4.1.6 The revised TE2100 Plan does not have a significant impact on the DCO application FRA conclusions, including the consideration of future Thames barrier options in the revised TE2100 plan.

5 References

Environment Agency, 2022. Flood risk assessments: climate change allowances. Available at https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances (last updated May 2022)

Environment Agency, 2023.Thames Estuary 2100 (TE2100). Available at https://www.gov.uk/government/collections/thames-estuary-2100-te2100#contents

Met Office, 2018. UKCP18 Guidance: Representative Concentration Pathways

UK Parliament, 2023. Transport Update Statement made on 9 March 2023 by Mark Harper MP. Available at: https://questions-statements.parliament.uk/written-statements/detail/2023-03-09/hcws625?utm_source=POLITICO.EU&utm_campaign=bfb46d9660-EMAIL_CAMPAIGN_2023_03_10_05_54&utm_medium=email&utm_term=0_10959edeb5-bfb46d9660-%5BLIST_EMAIL_ID%5D

Appendix A: Figures

Figure number	Drawing number	Description	Simulated event
1	HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91021	Difference in maximum flood depth: Post-(with mitigation) minus pre-development	Breach at TIL005 1000 year event in 2130
2	HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91022	Difference in maximum flood hazard category: Post-(with mitigation) minus pre-development	Breach at TIL005 1000 year event in 2130
3	HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91023	Maximum flood depth Pre-development Detail in Tilbury urban area west of Fort Road	Breach at TIL005 1000 year event in 2130
4	HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91024	Maximum flood depth Post-development (with mitigation) Detail in Tilbury urban area west of Fort Road	Breach at TIL005 1000 year event in 2130
5	HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91025	Maximum flood hazard category: Pre-development Detail in Tilbury urban area west of Fort Road	Breach at TIL005 1000 year event in 2130
6	HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91026	Maximum flood hazard category: Post-development (with mitigation) Detail in Tilbury urban area west of Fort Road	Breach at TIL005 1000 year event in 2130
7	HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91027	Difference in maximum flood depth: Post-(with mitigation) minus pre-development	Breach at TIL006 1000 year event in 2130
8	HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91028	Difference in maximum flood hazard category: Post-(with mitigation) minus pre-development	Breach at TIL006 1000 year event in 2130

Scenario / Flood Estimation Point	Breach TIL005
Return period (years)	1000
Climate change uplift applied (%)	Not applicable
Year	2130

0 0.5 KM

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	S9	10/11/2023	DCO Application	KK	RB	BF

Legend

- Route Alignment
- Earthworks
- NMU Routes
- Order Limits
- 2D Model domain
- TIL005 breach location
- 1D Channel
- 1D Channel diversions
- Compensation area
- Existing reservoir infilled
- Revised reservoir footprint

Difference in maximum flood depth (m)

- < -1.0
- -1.0 - -0.5
- -0.5 - -0.2
- -0.2 - -0.1
- -0.1 - -0.05
- -0.05 - -0.02
- -0.02 - -0.01
- -0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- 0.2 - 0.5
- 0.5 - 1
- > 1.0

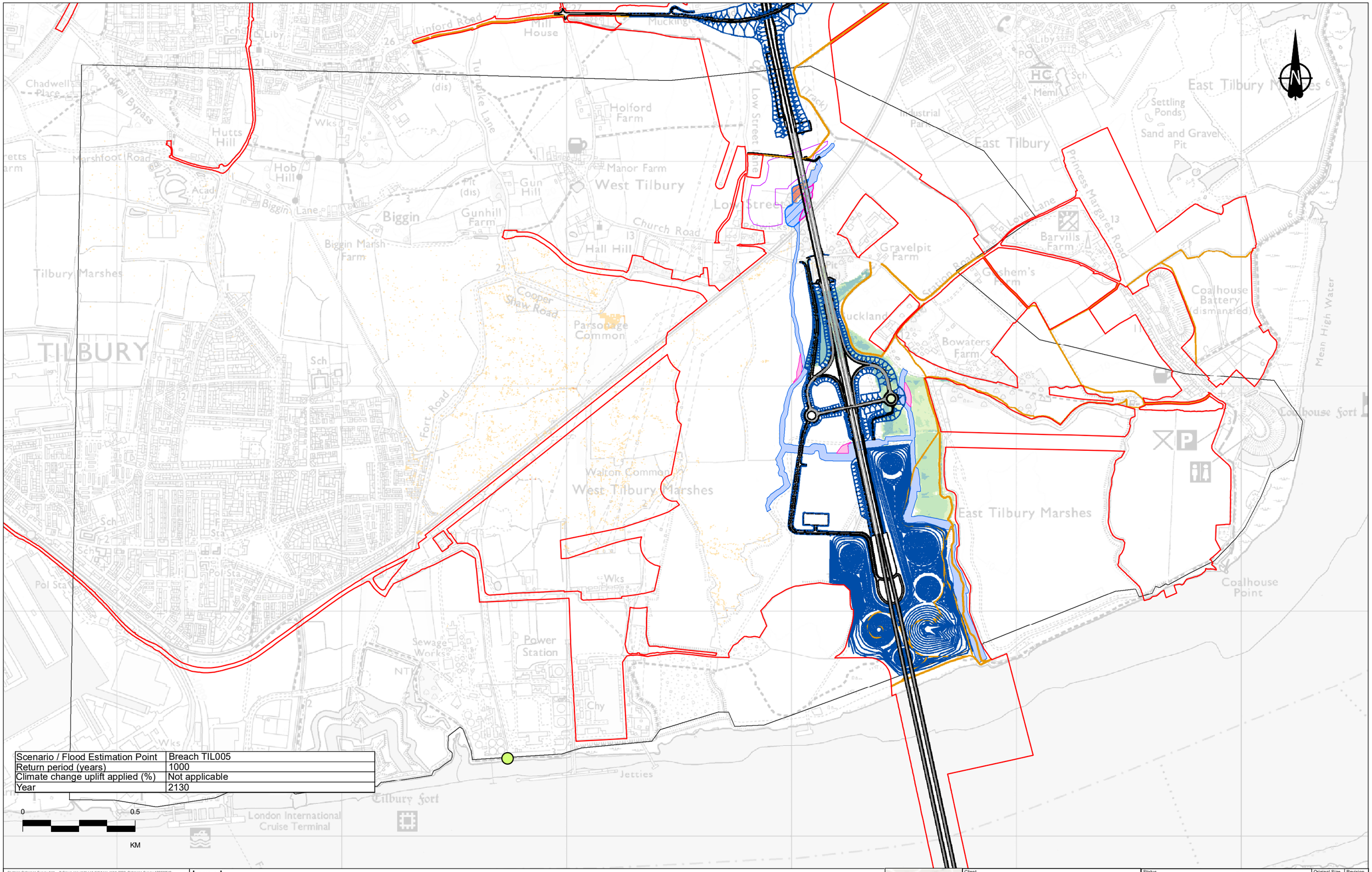
Client: national highways

Project: LOWER THAMES CROSSING

Status	S9	Original Size	A3
Application Document Number	N/A	Revision	P02
		Scale	1:15,000

Drawing title: FRA - Tilbury Modelling Results
Difference in maximum flood depth
Post-(with mitigation) minus pre-development
Figure 1

Drawing number: HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91021



Scenario / Flood Estimation Point	Breach TIL005
Return period (years)	1000
Climate change uplift applied (%)	Not applicable
Year	2130

0 0.5 KM

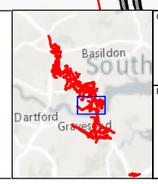
Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	S9	10/11/2023	DCO Application	KK	RB	BF

Legend

- Route Alignment
- Earthworks
- NMU Routes
- Order Limits
- 2D Model domain
- TIL005 breach location
- 1D Channel
- 1D Channel diversions
- Compensation area
- Existing reservoir infilled
- Revised reservoir footprint

Difference in maximum flood hazard category

- Degree of hazard increased by 4 category
- Degree of hazard increased by 3 category
- Degree of hazard increased by 2 category
- Degree of hazard increased by 1 category
- No change on degree of hazard
- Degree of hazard decreased by 1 category
- Degree of hazard decreased by 2 category
- Degree of hazard decreased by 3 category
- Degree of hazard decreased by 4 category



Client: national highways

Project: LOWER THAMES CROSSING

Status: S9 | Original Size: A3 | Revision: P02

Application Document Number: N/A | Scale: 1:15,000

Drawing title: FRA - Tilbury Modelling Results
Difference in maximum flood hazard category
Post-(with mitigation) minus pre-development
Figure 2

Drawing number: HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91022

Galsworthy Road

Portsea Road

Byron Gardens

Fort Road

Brennan Road

Scenario / Flood Estimation Point	Breach TIL005
Return period (years)	1000
Climate change uplift applied (%)	Not applicable
Year	2130

0 0.05 KM

Legend

Maximum flood depth (m)

- <= 0.125
- 0.125 - 0.25
- 0.25 - 0.375
- 0.375 - 0.5
- 0.5 - 0.625
- 0.625 - 0.75
- 0.75 - 0.875
- > 0.875

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	S9	10/11/2023	DCO Application	KK	RB	BF

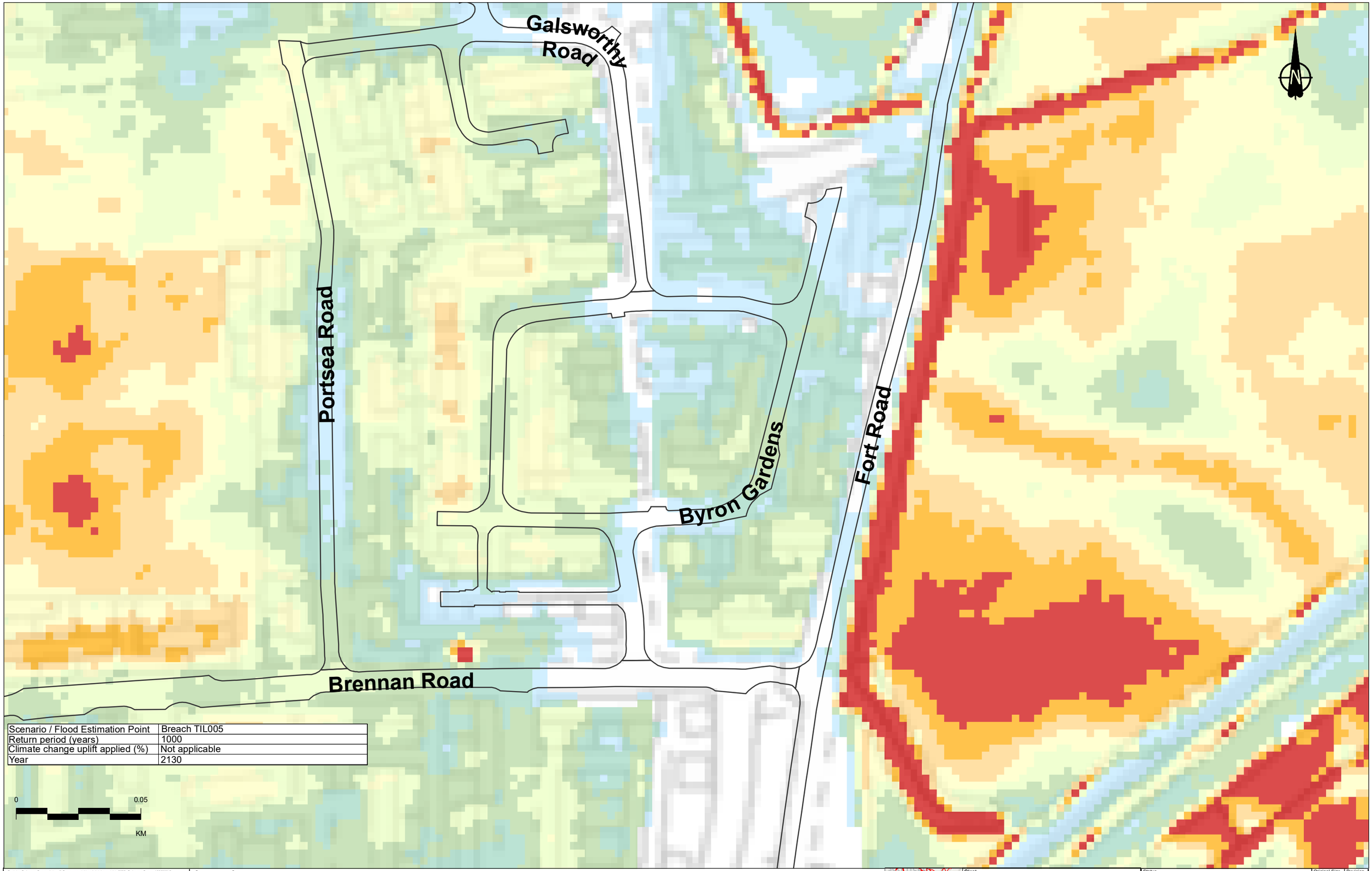
Client: national highways

Project: LOWER THAMES CROSSING

Status	Original Size	Revision
S9	A3	P02
Application Document Number: N/A	Scale: 1:1,351	

Drawing title: FRA - Tilbury Modelling Results
Maximum flood depth
Pre-development
Figure 3

Drawing number: HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91023



Scenario / Flood Estimation Point	Breach TIL005
Return period (years)	1000
Climate change uplift applied (%)	Not applicable
Year	2130

Legend

Maximum flood depth (m)

<= 0.125	0.25 - 0.375	0.625 - 0.75
0.125 - 0.25	0.375 - 0.5	0.75 - 0.875
	0.5 - 0.625	> 0.875

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	S9	10/11/2023	DCO Application	KK	RB	BF

Client: national highways

Project: LOWER THAMES CROSSING

Status	S9
Original Size	A3
Revision	P02
Application Document Number	N/A
Scale	1:1,351

Drawing title: FRA - Tilbury Modelling Results
Maximum flood depth
Post-development (with mitigation)
Figure 4

Drawing number: HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91024

Galsworthy Road

Portsea Road

Byron Gardens

Fort Road

Brennan Road

Scenario / Flood Estimation Point	Breach TIL006
Return period (years)	1000
Climate change uplift applied (%)	Not applicable
Year	2130

0 0.05 KM

Legend

Maximum flood hazard category

- 1: Very low hazard
- 2: Danger for some
- 3: Danger for most
- 4: Danger for all

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	S9	10/11/2023	DCO Application	KK	RB	BF

Client: national highways

Project: LOWER THAMES CROSSING

Status	S9
Original Size	A3
Revision	P02
Application Document Number	N/A
Scale	1:1,351

Drawing title: FRA - Tilbury Modelling Results
Maximum flood hazard category
Pre-development
Figure 5

Drawing number: HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91025

Galsworthy Road

Portsea Road

Byron Gardens

Fort Road

Brennan Road

Scenario / Flood Estimation Point	Breach TIL005
Return period (years)	1000
Climate change uplift applied (%)	Not applicable
Year	2130

0 0.05 KM

Legend

Maximum flood hazard category

- 1: Very low hazard
- 2: Danger for some
- 3: Danger for most
- 4: Danger for all

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	S9	10/11/2023	DCO Application	KK	RB	BF

Client: national highways

Project: LOWER THAMES CROSSING

Status	S9
Original Size	A3
Revision	P02
Application Document Number	N/A
Scale	1:1,351

Drawing title: FRA - Tilbury Modelling Results
Maximum flood hazard category
Post-development (with mitigation)
Figure 6

Drawing number: HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91026

Scenario / Flood Estimation Point	Breach TIL006
Return period (years)	1000
Climate change uplift applied (%)	Not applicable
Year	2130

0 0.5 KM

Legend

- Route Alignment
- Earthworks
- NMU Routes
- Order Limits
- 2D Model domain
- TIL006 breach location
- 1D Channel
- 1D Channel diversions
- Compensation area
- Existing reservoir infilled
- Revised reservoir footprint

Difference in maximum flood depth (m)

- < -1.0
- -1.0 - -0.5
- -0.5 - -0.2
- -0.2 - -0.1
- -0.1 - -0.05
- -0.05 - -0.02
- -0.02 - -0.01
- -0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- 0.2 - 0.5
- 0.5 - 1
- > 1.0

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	S9	10/11/2023	DCO Application	KK	RB	BF

Client: national highways

Project: LOWER THAMES CROSSING

Status: S9 | Original Size: A3 | Revision: P02

Application Document Number: N/A | Scale: 1:15,000

Drawing title: FRA - Tilbury Modelling Results
Difference in maximum flood depth
Post-(with mitigation) minus pre-development
Figure 7

Drawing number: HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91027

Scenario / Flood Estimation Point	Breach TIL006
Return period (years)	1000
Climate change uplift applied (%)	Not applicable
Year	2130

0 0.5 KM

Rev	Status	Rev. Date	Purpose of revision	Drawn	Chck'd	Apprv'd
P02	S9	10/11/2023	DCO Application	KK	RB	BF

Legend

- Route Alignment
- Earthworks
- NMU Routes
- Order Limits
- 2D Model domain
- TIL006 breach location
- 1D Channel
- 1D Channel diversions
- Compensation area
- Existing reservoir infilled
- Revised reservoir footprint

Difference in maximum flood hazard category

- Degree of hazard increased by 4 category
- Degree of hazard increased by 3 category
- Degree of hazard increased by 2 category
- Degree of hazard increased by 1 category
- No change on degree of hazard
- Degree of hazard decreased by 1 category
- Degree of hazard decreased by 2 category
- Degree of hazard decreased by 3 category
- Degree of hazard decreased by 4 category

Client: national highways

LOWER THAMES CROSSING

Status: S9 | Original Size: A3 | Revision: P02 | Scale: 1:15,000

Application Document Number: N/A

Drawing title: FRA - Tilbury Modelling Results
Difference in maximum flood hazard category
Post-(with mitigation) minus pre-development
Figure 8

Drawing number: HE540039-CJV-EFR-SZP_GNZZZZZZZZ-DR-LF-91028

Annex C.14 Environment Agency acceptance of LTC's 'Allowing for new information since completing the DCO Application Flood Risk Assessment' technical note

creating a better place

Environment Agency

[redacted]

Our ref: KT/2023/130956/01-L01
Your ref: Lower Thames Crossing

Date: 24 October 2023

Dear [redacted]

LTC Tech Note- Allowing For New Information Since Completing The DCO Application Flood Risk Assessment

Thank you for consulting us on the above document.

We are satisfied with the findings of the Technical Note HE540039-CJV-EFR-GEN-TNT-ENV-00024 following submission of the Environmental Statement addendum, which was published to address the impacts of the two year re-phasing of the Project.

The technical note considers the updated Extreme Water Levels, revised Thames Estuary 2100 Plan and the additional two years due to the delayed completion date and their potential for these changes to impact the flood risk conclusions.

Please do not hesitate to contact us should you require any further information.

Yours sincerely

[redacted]

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Annex C.15 Environment Agency acceptance of LTC's 'Coalhouse Fort Flood Risk Assessment and Modelling'

creating a better place

Environment Agency

[redacted]

Our ref: KT/2023/131066/03-L01
Your ref: Lower Thames Crossing

Date: 03 November 2023

Dear [redacted]

Lower Thames Crossing 9.147 Coalhouse Fort Flood Risk Assessment and Modelling (October 2023)

Thank you for consulting us on the Coalhouse Fort Flood Risk Assessment and Modelling (ref TR010032/EXAM/9.147).

We can confirm that we are satisfied with the results and do not have any further comments.

Please do not hesitate to contact us should you require any further information.

Yours sincerely

[redacted]

Environment Agency
Orchard House Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Annex C.16 Outline Environmental Permitting Strategy

Lower Thames Crossing

Outline Environmental Permitting Strategy

DATE: December 2023
DEADLINE: 9A

HE540039-LTC-EGN-GEN-REP-DCO-00002

VERSION: P03

Revision History

Version	Date
P01	11 September 2023
P02	28 November 2023
P03	15 December 2023

Lower Thames Crossing

Outline Environmental Permitting Strategy

List of contents

Page number

List of plates

List of tables

Page number

1 Executive summary

1.1.1 The DCO will be the principal consenting mechanism for the development of the Project although supplemental permits will be required for activities, such as those required under the Environmental Permitting (England and Wales) Regulations 2016 (EPR).

1.1.2 Of the environmental permits needed for the Project it is recognised that those required for treating, recovering, re-using and disposing of excavated materials can be the most complex and are often bespoke waste permits.

1.1.3 On that basis, this OEPS has been developed in collaboration with the Environment Agency to present a series of permit scenarios and associated permit options. It is proposed that these can be further developed by the Contractors at the appropriate stage of the Project.

1.1.4 Complex environmental permits are considered at locations principally around the North and South Portal sites, although there are known third-party environmental permit interactions elsewhere.

1.1.5 A summary of the permit options is presented below and discussed in detail in Sections 4 and 5:

a. Scenario 1 – Standard rules waste and other permits

b. Scenario 2 – Placement of surplus material in Ashfields Landfill

c. Scenario 3 – Placement of material on Goshems Farm to create Tilbury Fields

d. Scenario 4 – Overlapping (or multiple operator) permit areas

e. Scenario 5 – Other construction works in third-party permit areas

1.1.6 A provision relating to interfaces with waste operation permits has been agreed with the Environment Agency and is referred to in this strategy and the scenarios above, as presented in Appendix A.

1.1.7 The approach to third-party permits is presented in Section 6. A register of third-party permits is presented in Appendix B.

1.1.8 This strategy also presents a summary of the abstraction licences and discharge consents which may be needed for the Project in Appendix C.

1.1.9 This strategy is currently intended to be a live document to provide the Environment Agency with a summary of the permitting strategy discussions to date.

1.1.10 This document has been updated following review with the Environment Agency during the DCO examination period, and a record of changes is presented in Appendix E of this document.

2 Introduction

2.1 Environmental permit background

2.1.1 National Highways understands that the Environment Agency regulates certain activities that have the potential to harm the environment and people (Planning Inspectorate, 2019). It decides if relevant environmental permits and other consents and licences should be issued and, if so, what conditions should be applied. It monitors compliance with the permit/licence conditions and takes enforcement action if appropriate.

2.1.2 In general, permits can either be standard rules or bespoke permits, depending on the type of activity, operation and the potential environment impact. In limited cases, a permit may not be needed if the activity meets the requirements of one of the Environment Agency Regulatory Position Statements.

2.1.3 National Highways understands that environmental permit(s) will be required for the operation of the following:

a. An ‘installation’, such as an industrial facility, manufacturer or other business that produces potentially harmful substances, for example, a large landfill site, a large chicken farm, a food factory, a furniture factory, a dry cleaner or a petrol station;

b. A waste operation where waste is recycled, stored, treated or disposed of;

c. A mining waste operation which manages waste produced from mines or quarries;

d. A medium combustion plant or specified generator;

e. A small waste incineration plant where certain types and quantities of waste are burned;

f. A mobile plant designed to move or be moved, for example, a machine that is moved onto a site to clean contaminated soil;

g. A solvent emission activity which releases organic solvents directly or indirectly into the air.

2.1.4 Unless an activity is exempt from the regulations, an environmental permit will also be required for the following work or activities:

a. A water discharge activity which releases pollution to surface water, such as rivers or streams;

b. A groundwater activity which releases pollution directly or indirectly to water underground;

c. Work in, under, over or near a main river (including where the river is in a culvert), or on or near a flood defence on a main river, in the flood plain of a main river, or on or near a sea defence;

d. Where the treatment of materials is carried out in accordance with a Mobile Plant permit, any subsequent point source discharge will require a separate permit(s);

e. The treatment of waters arising from construction activities, including point source discharges resulting from the treatment of materials regulated by Mobile Plant permit will require a new bespoke water discharge permit.

2.1.5 National Highways understands that excavated materials that are to be treated on, or off site are generally considered to be a waste and hence the operator of a treatment, storage or re-use facility for this material will either need an environmental permit or a waste exemption from the Environment Agency.

2.1.6 If the operation is a waste operation and/or an installation, the operator needs to demonstrate they are legally competent, have suitably qualified site managers, and technical and financial competence to undertake the activity.

2.1.7 As discussed below the DCO contains some provisions relating to the Environmental Permitting (England and Wales) Regulations 2016.

2.2 Project permit background

2.2.1 The Project is a Nationally Significant Infrastructure Project (NSIP) under the terms of the Planning Act 2008, and benefits from the intent of both the Planning Act 2008 and Government policy to enable development and construction-related consents to be included within the DCO. Therefore, where feasible and practical, additional consents have been included within the DCO.

2.2.2 However, while the DCO will be the principal consenting mechanism for the development of the Project, at the appropriate stage the application will be supplemented by other consent applications required for specific activities to deliver the development, which are covered by the Environmental Permitting (England and Wales) Regulations 2016 (EPR).

2.2.3 The Consents and Agreements Position Statement [**Document Reference 3.3 (8)**] outlines National Highways' strategy for securing consents and associated agreements needed to implement the Project. It identifies the types of consents and agreements needed to construct and operate the Project, and how the consents and agreements would be obtained.

2.2.4 The permits, consents and agreements that may need to be sought separately from the DCO are identified in Appendix A of the Consents and Agreements Position Statement [**Document Reference 3.3 (8)**] and in Table 4.2 of the Code of Construction Practice, First Iteration of Environmental Management Plan (CoCP) [**Document Reference 6.3 ES Appendix 2.2 (9)**].

2.2.5 The permits are largely dependent on finalisation of the detailed design, the detailed construction site set-up and methodologies, and discussions with the consenting authorities. Although the Preliminary Design for the Project is well developed, additional detailed design by the selected Contractors will follow DCO consent. This will further inform the permitting process and therefore at this stage in the project development, it is not possible to apply for permits.

Waste Permits

2.2.6 It was recognised that the environmental permits for using, treating, storing and disposing of excavated material can be complex, especially where third-party operations may be impacted and hence the Project has undertaken extensive early consultation with the Environment Agency to review the nature of the permit(s) required for different scenarios.

2.2.7 Multiple ‘standard rules’ environmental permits and consents will be required for the construction activities across the Project, e.g. storage and treatment activities, such as materials crushing, remediation plant, transfer stations and short-term material storage. Locations where such permits, or exemptions, would be required are primarily at construction compounds across the Project and are outside the scope of this strategy document.

2.2.8 National Highways understands that there are certain exemptions that do not need to be registered, depending on limits and conditions. However, the Environment Agency has provided feedback that the current exemptions list will be amended with certain exemptions withdrawn or restricted. Defra has published their consultation response (Supplementary Government Response, updated 13 February 2023 with associated annexes) and National Highways understands that the Environment Agency expect the changes to be rolled out in 2024 and 2025.

2.2.9 It will be up to the Main Works Contractor(s) to determine whether a waste exemption(s) will be required for their activities. Given the Project’s current position (outline design) National Highways would anticipate that within the four categories below, one or more exemption may be applied for.

a. U1 – Use of waste in construction

b. U10 – Spreading waste to benefit agricultural land

c. U11 - Spreading waste to benefit non-agricultural land

d. T5 – Screening and blending waste

e. S1 – Store waste in secure containers.

Water Resources and Discharge Permits

2.2.10 Water abstraction licences and environmental permits for water discharges and groundwater activities will be required for construction and operational activities, including construction de-watering, water supply for the Coal House Point wetland mitigation area, and water discharges at the North and South Portal sites.

2.2.11 Locations where such permits would be required are primarily construction compounds across the Project. During construction, construction compounds would be located along the Project route. Larger compounds would be required at the North and South Portals to allow for tunnelling operations and materials management.

2.2.12 A list of water abstraction or water discharges which may require licensing or consent is provided in Appendix C. As noted in the Consents and Agreements Position Statement [**Document Reference 3.3 (8)**], the Project will seek to re-engage with the Environment Agency when the Contractors are in place to progress the permit applications.

2.2.13 National Highways understands that there are unlikely to be any water permit exemptions that are appropriate for the Project although certain low-risk discharges and groundwater activities can be exempt based on meeting certain conditions. It should be noted that there are a number of proposed discharge activities from operational infiltration or retention ponds for which permits are not required and this has been agreed with the Environment Agency in the Statement of Common Ground [**REP7-102**].

2.3 The Development Consent Order

2.3.1 Within the draft DCO [**Document Reference 3.1 (11)**] provisions relating to the EPR are included. These are presented below.

Flood Risk Activity Permits

2.3.2 Article 53(1)(g) of Part 7 (Miscellaneous and General) regarding disapplication of legislative provisions, etc.:

'53. (1) The following provisions do not apply in relation to the construction of any work or the carrying out of any operation required for the purpose of, or in connection with, the construction of the authorised development and within any maintenance period defined in article 36(13), any maintenance of the authorised development—

(g) regulation 12 (requirement for environmental permit) of the Environmental Permitting (England and Wales) Regulations 2016(d) in respect of a flood risk activity.'

2.3.3 The Environment Agency's Protective Provisions are presented in Schedule 14 Part 9 of the draft DCO and include provisions for flood risk activities, including submission and approval of plans and construction of protective works.

2.3.4 There are similar Protective Provisions for the local drainage authorities in relation to flood and drainage related activities.

Interface with waste operation permits

2.3.5 The Project has included a provision in Article 68 of Part 7 "Interface with Waste Operation Permits" of the draft DCO. The drafting is presented in Appendix A for convenience.

2.3.6 The proposed provision would require the undertaker to consult with the Environment Agency and the third-party permit holder on a draft environmental scheme where works authorised by the DCO would give rise to inconsistency or conflict with an existing third-party permit.

2.3.7 The environmental scheme must contain appropriate measures to ensure:

a. the continued effective operation of the existing permit;

b. the methods to be used to remove or separate existing waste from land subject to an existing permit or land on which an authorised activity is carried out;

c. monitoring of land, air and water, equivalent to that required under the existing permit and measures relating to surrender which arise as a result of an authorised activity;

d. continued access arrangements, including in relation to monitoring, for the permit holder in connection with land retained by the permit holder which remains subject to the existing permit; and

e. an equivalent level of environmental protection to that which would be provided by either the existing permit or permit conditions.

2.3.8 The undertaker is required to update the environmental scheme based on representations received from the Environment Agency and the third-party permit holder and submit the final scheme to the Environment Agency to provide a regulator-initiated variation to the existing permit to allow the works to be undertaken.

2.3.9 The undertaker may also make an application following consultation with the Environment Agency and the third-party permit holder to surrender all or part of an existing permit within land which is part of the compulsory acquisition for the scheme.

2.4 Outline Environmental Permit Strategy Objectives

2.4.1 This Outline Environmental Permitting Strategy (OEPS) has been developed in collaboration with the Environment Agency. The strategy document presents our understanding of the discussions to date and the options developed to the Environment Agency.

2.4.2 The discussions to date have focused on the waste permitting regime under which management, re-use and treatment of excavated materials is covered, although the Project recognises the scope of the permit strategy may widen to include other permits associated with water abstractions and discharges.

2.4.3 The complex permits which are required by the Project to manage, treat, re-use and dispose of excavated materials are all likely to be bespoke permit applications, which would require legal and competency requirements, management and control systems, risk assessments, and plans and assessment as required by the technical guidance.

2.4.4 Furthermore, the North Portal area of the Project is a complicated environmental permitting area due to the type of construction activities, the number of potential permits required by the Project, and the presence of extant third-party environmental permits associated with waste operations within this area.

2.4.5 Due to these complexities, a series of permit strategy workshops has been ongoing with the Environment Agency since April 2022. The purpose of these workshops was to discuss the potential permit options and the strategy the Project may take to deliver the works, which is summarised herein.

2.4.6 This document is not proposed to be part of the DCO application or examination but instead seen as a position statement to present the outcomes of the workshops and National Highways' view of the permit and consent options available for review by the Environment Agency.

2.4.7 This strategy is currently intended to be a live document which can be updated through the examination period and beyond, as required. It should be noted that all permit and consenting solutions are subject to detailed design, and that the strategy may change as further information becomes available.

2.4.8 This strategy does not consider Part B permit activities which are regulated by the local authorities, and these will be addressed by the Contractor during the detailed design process as required.

2.4.9 The objectives of the OEPS are to present the following to the Environment Agency:

a. Outline the construction works likely to require waste permits and consents

b. Summarise the stakeholder engagement undertaken to date

c. Present the outline waste permit scenarios

d. Present the permit options identified for the Project

e. Present the approach to managing third-party permits

f. Present the abstraction licences and discharge consents which may be required for the Project

g. Present the proposed way forward and additional assessment which may need to be developed

3 Description of the works

3.1 Introduction

3.1.1 The details on the construction works, location and programme are presented in Environmental Statement Chapter 2: Project Description [**APP-140**].

3.1.2 This section presents the known and relevant construction works, for which there are likely to be material management and waste permitting implications over and above standard rules approaches and handling of materials, in accordance with site waste management plans.

3.1.3 This section also presents some of the inherent mitigation measures related to earthworks which are already considered in the design and the application documents.

3.2 Construction Design and Management

3.2.1 It should be noted that the design development process underpinning the construction design was an iterative process which took into account, amongst other environmental considerations, the following earthworks and waste management improvement outputs:

a. Re-use of materials on site

b. Reduction of carriageway widths

c. Optimisation of cut and fill to reduce volumes of materials being removed from site

3.2.2 Any potential adverse impacts associated with materials and waste management would be controlled with a series of construction phase control documents which are secured by the DCO.

3.2.3 These include the following control documents, which also contain further details of the earthworks and the proposed management of waste and materials:

a. Code of Construction Practice (CoCP), including the Register of Environmental Actions and Commitments (REAC) [**Document Reference 6.3 ES Appendix 2.2 (9)**]

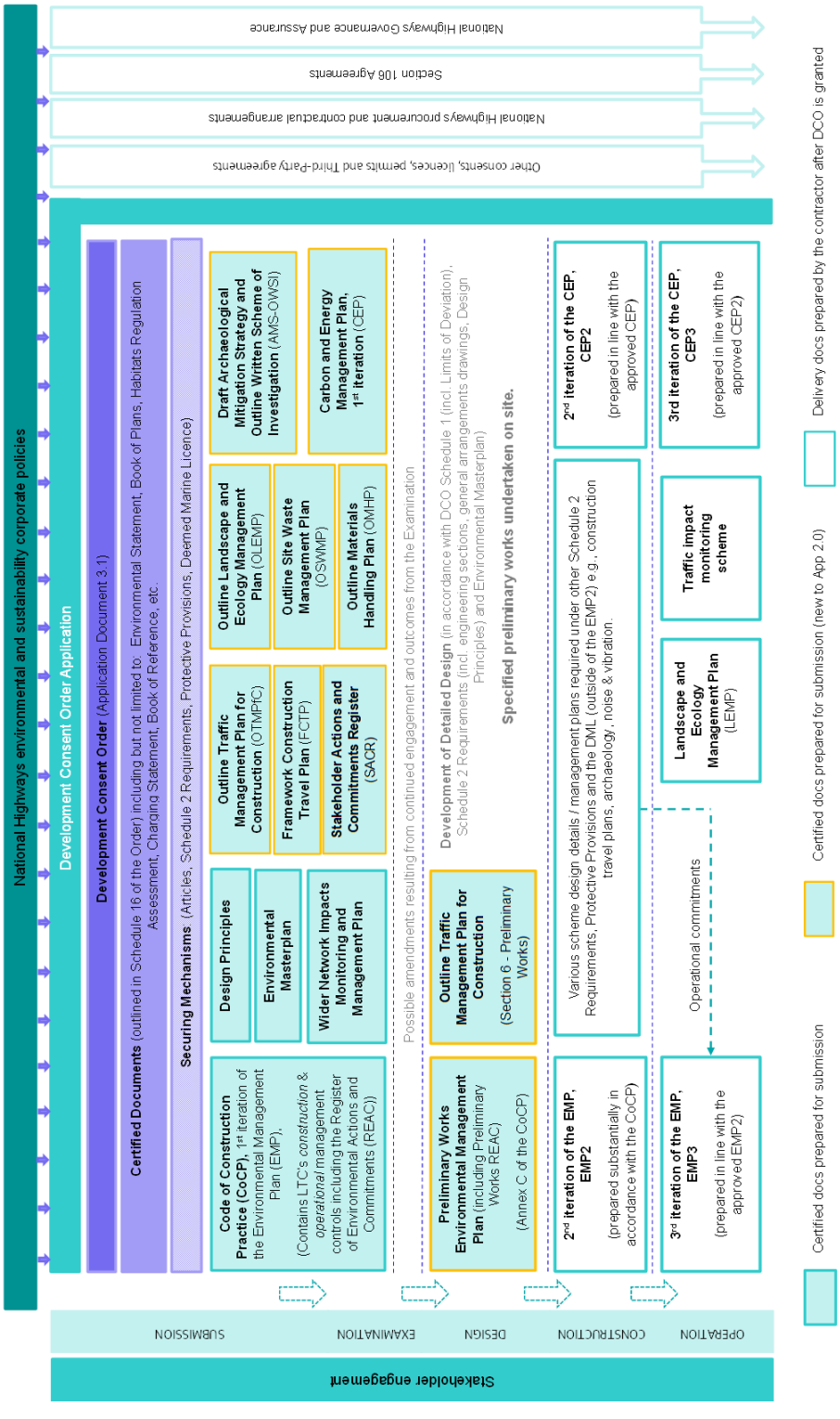
b. CoCP Annex A: Outline Site Waste Management Plan (oSWMP) **Document Reference 6.3 ES Appendix 2.2 Annex A (4)**]

c. CoCP Annex B: Outline Materials Handling Plan (oMHP) [**Document Reference 6.3 ES Appendix 2.2 Annex B (5)**]

d. Stakeholder Actions and Commitments Register [**Document Reference 7.21 (7)**]

3.2.4 These documents sit within a suite of documents known as the Control Plan, presented in the CoCP [**Document Reference 6.3 ES Appendix 2.2 (9)**], which is the framework for mitigating, monitoring and controlling effects of the Project. It is made up of a series of 'control documents' which present the mitigation measures identified in the application, which must be implemented during design, construction and operation to reduce the adverse effects of the Project, as presented in Plate 3.1.

Plate 3.1 The Control Plan



3.2.5 Furthermore, through the design process, sustainable construction considerations have been incorporated to promote re-use of materials on-site.

3.2.6 Although it is noted that the DCO consent, if granted, will need to be supplemented by other permit applications, i.e. waste permits required under the EPR, these other permit applications will be supported by the various detailed controls, commitments and mitigation measures which are secured in the DCO application.

3.2.7 For information, numerous commitments are included in the Code of Construction Practice, specifically with detailed commitments in Appendix 2.2 REAC [**Document Reference 6.3 ES Appendix 2.2 (9)**]. These include detailed commitments relating to controls for contamination risks and verification reporting, soil management, dewatering, site waste management, management of excavated materials and soils, construction water management and water discharges from the North and South Portal sites.

3.3 Construction overview

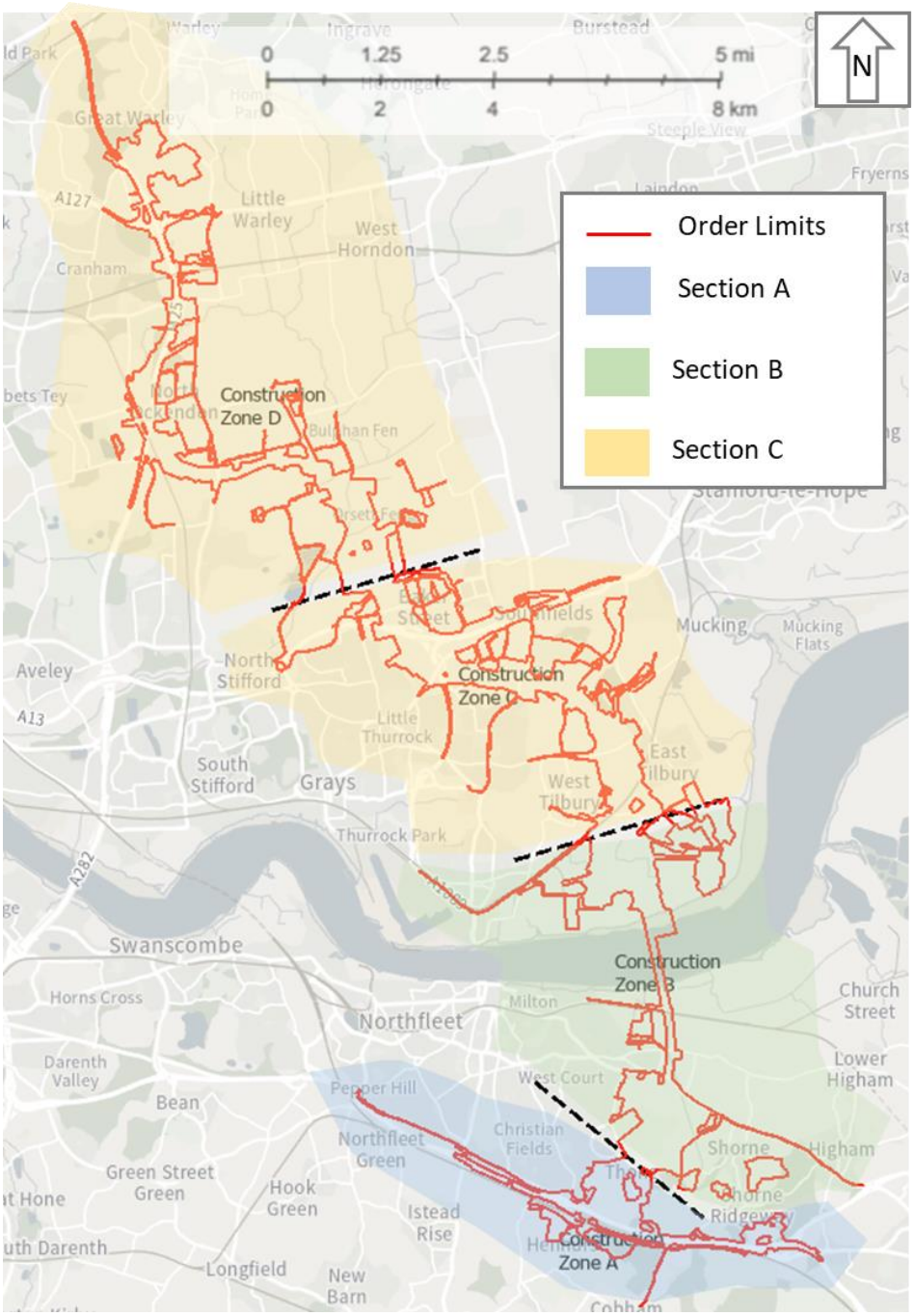
3.3.1 The construction of the Project has been split into three separate contracts broadly based on the Construction Zones shown in Plate 3.2Plate :

a. Section A: Kent Roads (Construction Zone A)

b. Section B: Tunnels and Approaches (Construction Zone B)

c. Section C: Roads North of the River Thames (Construction Zone C and D)

Plate 3.2 Construction Contract Areas



3.3.2 Details on the construction activities in each contract area are presented in Environmental Statement Chapter 2: Project Description [**APP-140**] and are not repeated in this strategy.

3.3.3 A summary of the construction activities and locations, which are likely to be subject to bespoke environmental permits, are discussed below in Sections 3.4 to 3.6.

3.3.4 It should be noted that further permit issues may become apparent during the detailed design process especially relating to interactions with existing third-party operators within and adjacent to the Order Limits. Known third-party permit interactions are detailed in Section 6.

3.4 Section A: Kent Roads

3.4.1 A significant amount of earthworks is required for the deep cutting between the proposed M2/A2/A122 Lower Thames Crossing junction and the South Portal. There would also be a false cutting along the M2/A2/A122 Lower Thames Crossing junction slip roads near Thong village.

3.4.2 The ground to be excavated south of the River Thames is mostly chalk, covered by a layer of topsoil around 0.25m in depth. The topsoil layer would be removed, stored and reused within the Project, for example, to provide a top layer on nearby embankments for seeding with vegetation.

3.4.3 The excavated chalk would be reused around the South Portal for the new landscaped area, Chalk Park, and also reused to create permanent road embankments for the M2/A2/A122 Lower Thames Crossing junction slip roads.

3.4.4 Environment permit requirements for the storage and placement of excavated chalk are discussed further in Section 5.

3.5 Section B: Tunnels and Approaches

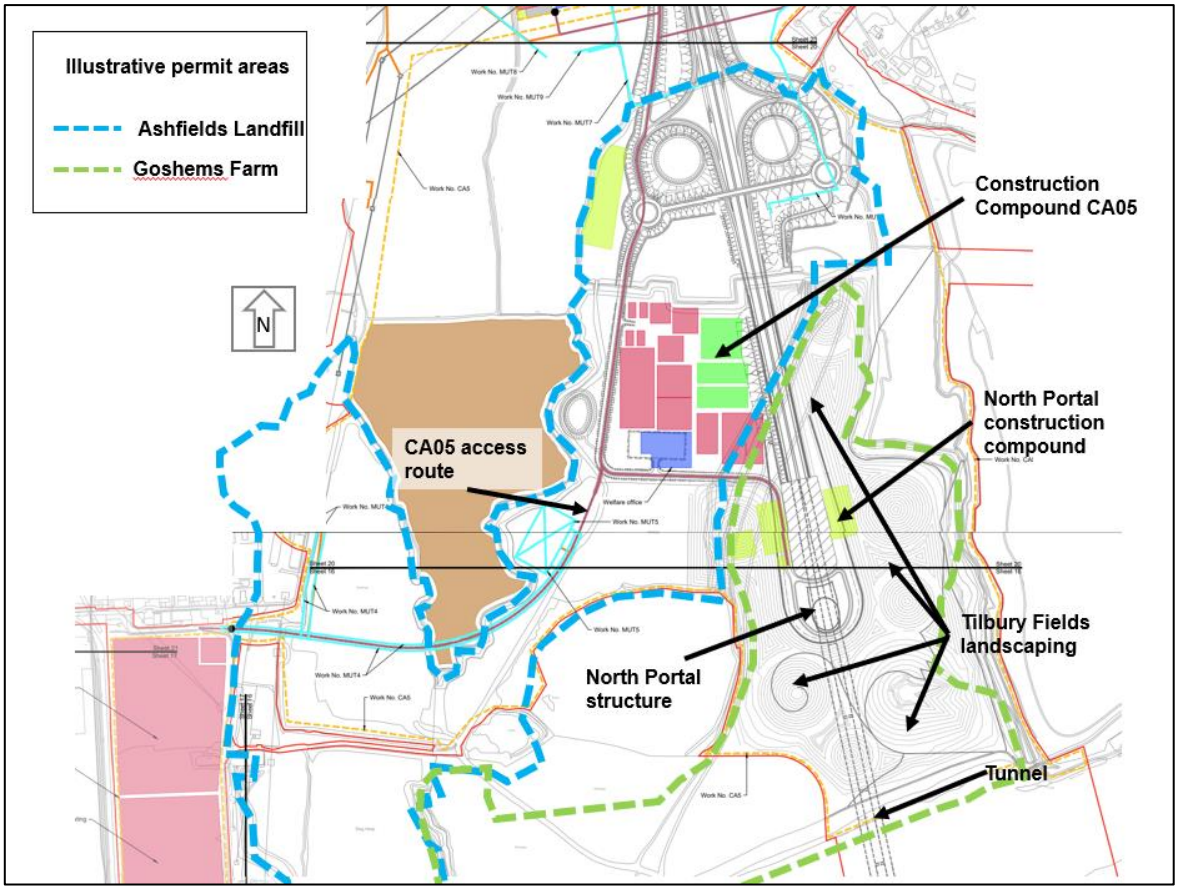
3.5.1 Section B: Tunnels and Approaches covers the area between the proposed Thong Lane green bridge north and the proposed Tilbury Viaduct. This includes the work needed to construct the tunnels and their approach roads, south and north of the River Thames. A ground protection tunnel would run from south of Lower Higham Road to north of the Thames and Medway Canal and North Kent railway line.

3.5.2 From a permitting perspective, Section B: Tunnels and Approaches, and particularly the North Portal site area, are the most complex as the works will involve earthworks within areas with extant recovery and landfill permits at Goshems Farm and Ashfields Landfill, respectively; and the management, treatment and re-use of tunnel arisings to create the Tilbury Fields landscape and ecological mitigation area.

3.5.3 Environmental permit applications and interactions with third-party permit holders are likely required to commence earlier in the programme at the North Portal site area due to the complexities in this area, which are expanded further in Section 4.

3.5.4 A plan showing the proposed works and the Ashfields Landfill and Goshems Farm permit boundaries is presented in Plate 3.3.

Plate 3.3 Indicative sketch of North Portal works and permit boundaries



3.5.5 A summary of the pertinent works which have complex environmental permit considerations in Area B is presented below by work stage.

Preliminary and initial works

3.5.6 These works will be completed following DCO grant and the commencement of construction. The works and controls on the limits on these preliminary works are detailed in Section 3 of the CoCP [**Document Reference 6.3 ES Appendix 2.2 (9)**].

3.5.7 The preliminary works are largely non-intrusive activities which would be undertaken in advance of initial construction and earthworks required to set up the construction compounds, and undertake ground improvement activities. The preliminary and initial works would involve:

a. Possible initial survey works and ecological mitigation as part of the preliminary works for which permits may be needed, although these are unlikely to require complex or bespoke environmental permits.

b. Set up of North and South Portal construction compounds with associated site preparation, foundations and utility diversions. The North Portal compound will be largely located on Ashfields Landfill and will comprise multiple facilities.

c. Construction of a haul road across Ashfields Landfill to the construction compound.

d. Ground treatment works to support the construction works in and around the North Portal, including within Ashfields Landfill and Goshems Farm waste recovery areas.

Approaches and structures

3.5.8 These works take place at the North and South Portals during the main construction phase and involve the earthworks and ground engineering to create the tunnel portals, the tunnel boring machine (TBM) launch and receive chambers, and the access ramps to the tunnel portals.

a. The excavation works at the North Portal will be through the Ashfields Landfill area and the Goshems Farm waste recovery and former Victorian landfill, and into the underlying alluvial deposits.

b. The works will also require construction dewatering for the TBM launch chamber.

c. The excavation works will produce large volumes of arisings, which will be reused at the North Portal to create the Tilbury Fields landscape and ecological mitigation area, and at the South Portal to create the Chalk Park landscape feature.

d. The excavation at the South Portal will predominantly be in natural chalk.

Tunnelling

3.5.9 Following completion of the launch chamber and portals, the tunnels will be excavated using either one or two tunnel boring machines (TBMs). In the event that one TBM is used, it will be turned around after the first southbound drive and redriven northwards. In either case, the tunnel spoil would emerge at the North Portal and will be managed at the northern tunnel entrance compound by the selected Contractors.

a. The excavations for the main crossing tunnels and its approaches are anticipated to produce approximately 1.44M m^3 of tunnel spoil (mainly chalk slurry) and 0.38M m^3 of other materials (clay, silt and peat, etc.). Together this totals 1.82M m^3, which will bulk after excavation to around 2.25M m^3.

b. The material will be processed, temporarily stored and then spread as fill to create the Tilbury Fields landscape and ecological mitigation area.

c. The processing of the materials will require slurry treatment works and filter presses, and also management and discharge of wastewater.

d. Tilbury Fields is to be mostly created on Goshems Farm, overlying the current waste recovery permit area and the former Victorian landfill, although not all of Goshems Farm is within the Order Limits. Some of the Tilbury Fields area will also overlie the Ashfields Landfill.

3.5.10 Multiple activities are likely to require environmental permits for these construction activities and they will mostly be within areas which currently have extant environmental permits, as discussed in detail in Sections 5 and 6.

Earthworks and environmental mitigation

3.5.11 Earthworks activities for Section B: Tunnels and Approaches involve the movement, processing and placement of excavated material would continue throughout the construction activities described above, such as the excavation of approaches and structures and boring of the tunnels.

3.5.12 The material excavated from the approaches and structures and tunnelling work would be temporarily stored within the construction compounds until placed in the permanent locations at Chalk Park, adjacent to the South Portal, and at Tilbury Fields, adjacent to the North Portal, with surplus material placed at Ashfields Landfill.

3.5.13 Following the placement of the excavated material, the associated landscaping works would be undertaken to create the ecological and landscape features, including woodland planting, species-rich grassland and Open Mosaic Habitat.

3.5.14 The creation of Chalk Park and Tilbury Fields forms part of the embedded environmental mitigation proposals for the Project.

3.6 Section C: Roads North of the River Thames

3.6.1 Section C: Roads North of the River Thames includes the area north of the River Thames between the proposed Tilbury Viaduct and Green Lane, north of the A13/A1089/A122 Lower Thames Crossing junction.

3.6.2 Although there are no significant or complex waste-related activities within Section C: Roads North of the River Thames, there are a number of third-party environmental permit activities located within Section C: Roads North of the River Thames which may clash with the DCO works and the land acquisition required within the Order Limits.

3.6.3 These are mostly located within the Chadwell St Mary link of the route that runs through Linford and past Ockendon to the A13 Junction.

3.6.4 These are expanded on in Sections 5 and 6.

4 Permit scenarios

4.1 Environment permit strategy workshops

4.1.1 National Highways has held environmental permitting workshops with the Environment Agency since April 2022. A list of the topics that have been discussed with the Environment Agency and other stakeholders is presented in Appendix A.

4.1.2 During the environmental permitting workshops the concept of permit scenarios was developed though discussion on proposed construction works and methodologies, locations and interactions with extant permits.

4.1.3 The permit scenarios were framed to aid the discussion and develop a way forward for the more complex permits, and to present some outline consenting solutions.

4.1.4 The following permit scenarios were identified and are discussed in more detail below.

a. Scenario 1 – Standard rules waste and other permits (referred to as 'business as usual' permits in the discussions)

b. Scenario 2 – Placement/disposal of material within Ashfields Landfill

c. Scenario 3 – Placement of material on Goshems Farm to create Tilbury Fields

d. Scenario 4 – Overlapping permit areas

e. Scenario 5 – Other construction works within third-party permit area

4.2 Assumptions

4.2.1 The following outline assumptions support the strategy:

a. It is assumed that these scenarios are representative of the more complex permitting issues for the Project.

b. The permit scenarios will be developed further as detailed design progresses.

c. The Contractors will be the permit applicant for the activities required for the works, unless mentioned otherwise in the options below.

d. Third-party permit holders will be generally supportive and cooperative with the changes that may be required to their permits. Contractors will assist in variations, transfers or surrenders to permits, if required.

e. The permit scenarios are largely theoretical but are intended to provide guidance of the permit routes available for different scenarios.

f. All third-party waste permits within the Order Limits (including those which may have been approved or varied since the completion of the Environmental Statement) will be identified prior to works commencing.

g. Project construction and operation works will be assessed against extant permit conditions to determine whether there are any clashes with the permit conditions, at the relevant point in the future.

h. Any identified clashes will be assessed to determine whether the third-party permit may need to be varied or surrendered, in co-ordination with the third party. However, in some cases this may not be practical or possible, in which case the DCO includes a provision for varying or surrendering existing waste operation permits (as presented in Appendix A).

i. Any tests required to support waste permit applications should be aligned with the National Policy Statement for National Networks (Department for Transport, 2014).

j. The earthworks required for the South Portal will not require any complex waste disposal or recovery permits. It is intended that the natural chalk excavated to create the South Portal and approach cutting will be placed under the CL:AIRE Definition of Waste Code of Practice (DoWCoP) to create Chalk Park and the wooded hilltop landforms required to support the landscape mitigation measures for the Project.

k. The Contractors are responsible for the detailed design of Tilbury Fields and the earthworks specifications and any treatment required for the placement of materials in Tilbury Fields and disposal of surplus material in Ashfields Landfill or elsewhere as required. It is assumed that tunnel arisings will meet the requirements for re-use at Tilbury Fields following treatment to be designed by the Contractors.

4.2.2 Further information on third-party permits is presented in Section 7 below.

4.3 Scenarios

Scenario 1 – Standard rules waste and other permits

4.3.1 This permit scenario is for the ‘business as usual’ standard, routine or non-complex permits, which is assumed the Contractor will need for standard construction works.

4.3.2 They are considered to include standard rules permits for mobile plant or waste treatment, waste handling, storage and disposal as required, and discharge consents or abstraction licences (although the latter are currently outside the EPR, it is understood they are to be brought within the EPR in the future).

4.3.3 This scenario was developed to provide the Environment Agency with information on the timing and indicative level of construction activity in each of the Project contract areas, to enable future resource planning within the permitting teams.

4.3.4 It is expected that there would be multiple permits required for various Contractors activities as they mobilise to site, and therefore this scenario has provided the Environment Agency with an early forecast on the likely timeframes and construction works proposed as set out in the DCO application.

4.3.5 The figures presented in Environmental Statement Chapter 2: Project Description [**APP-140**] provide the location of the activities, the 'intensity' of the works and the construction programme at the time of submission. On this basis, this information was considered sufficient by National Highways to provide the Environment Agency with details on potential resourcing requirements at this stage of the application process.

4.3.6 It should be noted that within the envisaged roles and responsibilities for the Project construction phase detailed in Section 4.2 of the CoCP [**Document Reference 6.3 ES Appendix 2.2 (9)**] the Contractor(s) would have a Contractor Consents Manager who would have the responsibility for preparing, implementing, maintaining and updating a Consents Management Plan and Consents Register(s) and therefore it is expected that further information on the timings and nature of the permits required will be available as detailed design progresses.

4.3.7 Further details on the proposed permit application approach by the Contractors are presented in Section 7 below.

Scenario 2 – Placement/disposal of material within Ashfields Landfill

4.3.8 This scenario was developed to explore the potential permitting routes and issues in the event that surplus tunnel spoil material would need to be placed in the operational Ashfields Landfill site.

4.3.9 A 'worst-case' assumption in the Environmental Statement assumes a maximum volume of surplus material of 660,000m^3 that would need to be disposed of at Ashfields Landfill.

4.3.10 Ashfields Landfill is currently permitted to receive inert waste and certain wastes arising from tunnelling activities from other major infrastructure projects, including some with tunnel additives. Ashfields Landfill is located adjacent to the North Portal and within the Order Limits.

4.3.11 The Project material to be placed in Ashfields Landfill is likely to mostly comprise of tunnel arisings, such as chalk slurry, with a high pH and potentially containing additives, such as lime, used to stabilise and improve the geotechnical properties of the material.

4.3.12 National Highways understands that in accordance with the permitting requirements, the Environment Agency would require an assessment on the use of any tunnelling additives to demonstrate that they would not have an impact on groundwater or surface water quality, including that the appropriate quantity used is in line with the manufacturer's protocols.

4.3.13 Any waste materials containing additives would need to be appropriately characterised in accordance with the Environment Agency guidance WM3 (Guidance on the classification and assessment of waste (1st Edition v1.2.GB) Technical Guidance WM3, October 2021).

4.3.14 The operator of Ashfields Landfill has previously varied its permit to receive analogous material from other tunnelling projects, such as Tideway and Silvertown Tunnel. In the case of the Project, it may be possible that a variation would not be required for the material type; however, unknowns remain regarding volumes requiring disposal and any treatment process and additives required for the chalk slurry.

4.3.15 In summary, the assumed permit solutions for Scenario 2 are discussed below and will need to be developed further during detailed design by the Contractor as they develop their Consents Management Plans.

4.3.16 All the options below consider that this would be waste activity and will be undertaken under a new or existing Environmental Permit.

Scenario 2 permit options:

a. **No variation of Ashfields Landfill permit required.** This option is applicable assuming the current Ashfields Landfill permit would meet the Project needs.

b. **Variation of Ashfields Landfill permit**. This option assumes that a variation will be required to accept the Project material. Assuming:

   i. The Ashfields operator are the legal operator at Ashfields when tunnelling works commence.

   ii. The Ashfields operator are willing to amend their permits to accept surplus tunnel spoil or the Environment Agency are able to issue a regulatory initiated variation based on an environmental scheme submitted by the Contractor or National Highways.

   iii. The permit variation can be agreed with the Environment Agency.

c. **The Ashfields operator to transfer their landfill permit to the Contractor or National Highways**, in the event that the Ashfields operator are unable to be the operator during construction works. Assuming:

   i. The operator is willing and able to transfer their permit.

   ii. National Highways or Contractor can be a legal operator as defined under the EPR. Either party could be responsible for restoration and aftercare requirements to surrender the permit, following completion of the works. If National Highways were required to take the permit in this case, it is likely that the Contractor would still be responsible for the activity.

   iii. Suitable commercial, insurance and legal mechanisms are in place to manage liabilities and bonds to the Environment Agency.

d. **Surrender of Ashfields permit and National Highways or the Contractor to apply for new permit**. Some areas within Ashfields Landfill have either not been used, have already been restored, or may have void spaces remaining when the works commence. This may allow surrender of some of the areas at the Ashfields Landfill and hence a new landfill permit or a Deposit for Recovery permit could be applied. This option would depend on the status of the Ashfield site at surrender and agreement with the Environment Agency. Assuming:

   i. The Operator is able to surrender/part surrender their permit prior to the commencement of construction works.

   ii. National Highways or the Contractor are able to apply for, and secure, a new permit prior to the commencement of construction works.

   iii. National Highways or the Contractor can be a legal operator as defined under the EPR for the permit. Either party could be responsible for restoration and aftercare requirements to surrender the permit following completion of the works.

   iv. A Deposit for Recovery permit may be an option for the Contractor to place surplus materials in an empty cell/void space. The Environment Agency has commented that recovery may be able to be agreed for infilling into empty cells or voids if that infilling can be demonstrated to provide a benefit, for example for engineering or stability purposes.

Scenario 3 – Placement of material on Goshems Farm to create Tilbury Fields

4.3.17 This scenario was developed to explore the permit routes under which the Tilbury Fields landscape and ecological mitigation area can be constructed. Tilbury Fields forms part of the embedded mitigation measures for the Project and will be constructed using all, or the majority, of the tunnel arisings from the North Portal.

4.3.18 Tilbury Fields is to be mostly constructed on part of a former Victorian landfill and a contemporary landfill regulated under the EPR (known as Goshems Farm). This site currently has an environmental permit for a Deposit for Recovery scheme operated by the same operators at Ashfield Landfill for the placement of recovered inert material.

4.3.19 This area is within the permanent acquisition area, adjacent to the North Portal, and will become public open space with an Open Mosaic Habitat to support the ecological mitigation for the Project. This includes the reuse of pulverised fuel ash to create a low nutrient habitat as detailed in the Design Principles [**Document Reference 7.5 (7)**].

4.3.20 The North Portal structure, the tunnel, access ramp and various enabling works are also due to be constructed within Goshems Farm.

4.3.21 It should be noted that the existing planning permission for the landscaping at Goshems Farm expires on 31 October 2026, by which time the restoration works should be completed and therefore the environmental permit for these works could have been surrendered. However, it is likely that the extant permit, may still be in place when enabling works commence.

4.3.22 Initial discussions were held on whether Tilbury Fields area could be developed under a Materials Management Plan approach, set out under the CL:AIRE Definition of Waste Code of Practice (DoWCoP) route, which had precedence with similar works undertaken for HS2.

4.3.23 However, this approach was not taken forward on advice from the Environment Agency that it could not be applied on areas with existing environmental permits or over historical waste sites, such as Goshems Farm.

4.3.24 Based on further research and discussions, the other waste permit options for the placement of tunnel arisings were refined as:

a. Deposit for Recovery (DfR) permit (preferable), or worst case

b. A landfill disposal permit (not-preferable)

4.3.25 At the time of writing, the Project has assumed that a DfR permit would be an appropriate permit option for this activity. The Environment Agency has confirmed that they do not object to this approach dependent on the application meeting the requirements of this permit, which are detailed in the guidance (Environment Agency, 2023) for waste recovery plans and deposit for recovery permits and include the following:

a. A waste recovery plan

b. Evidence of either:

   i. financial benefit by using non-waste materials or funding to use non-waste materials; or

   ii. obligations to complete the scheme, including specific or general obligations

c. Evidence that the waste is serving a useful purpose

d. Planning permission, or grant of the DCO in this instance

e. Quantity of the waste used to demonstrate only the amount of waste needed will be used to carry out the function

f. Meeting quality standards

g. Associated risk assessments and monitoring plans as required.

4.3.26 However, complications around the waste permitting due to the presence of third party permits in this area remain and will need to be developed through detailed design and pre-application discussion with the Environment Agency. The following issues have been identified to date:

a. The area is within the permanent acquisition area and hence it is possible that the surrender of the existing third-party permit for DfR at Goshems Farm will be required to allow DCO the works to proceed.

b. There is potential to transfer the existing permit to the Contractor, who then may be able to vary this permit. This may be a complex approach but could provide Project benefits, as this would not require a new permit application; however, this would require the existing permit holder to be amenable to this approach, and be able to participate in the transfer process.

c. Should the existing permit be surrendered prior to works commencing, the Contractor will need to have a new permit in place. This would require applying for a new DfR permit, providing all relevant information and fulfilling requests for potential further information by the Environment Agency as part of the application process, as well as a period of public consultation.

d. The Project's position is that the permit application would need to meet the waste requirements set out in the National Policy Statement for National Networks (Department for Transport, 2014). As noted above the DfR permit application would be subject to additional financial, needs, quantity and obligation requirements and demonstrate the material is suitable for use.

e. The Environment Agency has confirmed that where an extant permit is in place for a specific activity, it is possible to have multiple site operators and hence the Contractor would be able to apply for a new permit if required, whilst the current extant permit is still in place. However, National Highways understands that the Environment Agency will likely require an aftercare plan / monitoring, prior to a surrender application being made for the extant third party permit, unless otherwise agreed.

f. Issues relating to conflicts with the existing third-party permit at Goshems Farm are discussed in Scenarios 4 and 5 below.

4.3.27 In summary the assumed permit solutions for this scenario are:

Scenario 3 permit options:

a. **Contractor to apply for new Deposit for Recovery permit**. Assuming the extant DfR permit cannot be transferred, or extant permit will be surrendered prior to works commencing, or works can commence with extant permit still in place.

b. **Extant permit to be transferred to Contractor or National Highways.** Contractors to vary permit for Tilbury Fields assuming permit can be transferred, likely with new waste management plans.

Scenario 4 – Overlapping permit areas

4.3.28 This scenario was developed to explore the issues in having two or more environmental permits over the same area of land, held by different operators for different activities.

4.3.29 An example of this could be where an existing third-party organisation holds a permit for waste management, but the Project will have temporary access rights and will need to undertake a waste activity, which also requires a new permit within the same area of land. For example, Contractor operation of a slurry treatment plant at the North Portal compound within the Ashfield Landfill permit boundary.

4.3.30 In this instance, there may be activities or monitoring conditions which are suitable under one permit but may clash with the conditions of the other permit.

4.3.31 Through stakeholder engagement, the Environment Agency has confirmed that overlapping permits, or multiple site operations are allowable and enforceable under the EPR.

4.3.32 However, the Project is aware that this does present a risk to both National Highways and the third-party permit holder, and that situations may arise where one activity could cause the other activity to breach permit conditions (for example, emissions monitoring or waste classifications).

4.3.33 Furthermore, the Environment Agency may also require the third-party permit to be varied if there are any activities within the new permit which could impact on the third-party's permit conditions, including operating techniques and emissions monitoring, which could risk programme delays and complications with the third-party agreements.

4.3.34 The Environment Agency has confirmed that under normal circumstance no works can be undertaken within a permit holder's area without their consent, and without agreement with the Environment Agency.

4.3.35 On this basis a provision which is presented in Appendix A has been included in the DCO relating to interfaces with waste operations, which allows for the Environmental Agency to issue a regulator-initiated permit variation for the existing permit, based on an approved environmental scheme to be submitted by the Contractor or National Highways.

4.3.36 Through the workshops undertaken to date, the Environment Agency recommended that careful planning, management and monitoring of overlapping permit activities would be required.

4.3.37 Furthermore, the Contractor will need to consider all appropriate commitments in the REAC and their Environmental Management Plan (EMP) to ensure all risks and liabilities are being suitably managed or mitigated.

4.3.38 On this basis, the permit options for Scenario 4 are summarised below:

Scenario 4 permit options:

a. **No inconsistency or conflict with an existing permit**. The Contractor to engage with the permit holder to determine whether inconsistencies may arise between any new permit required for the DCO works and the existing third-party permit. If no inconsistencies are identified, then the Contractor shall give reasonable notice to the permit holder to enable appropriate steps to be taken to ensure the permit holder will be able to comply with their relevant permit conditions.

b. **Inconsistencies or conflicts with third-party permit identified.** Where conflicts are likely between permit conditions, the likely options are considered to be:

   i. **Third-party permit holder to vary their permit.** This option may be beneficial in the event that the permit variations are minor and the third-party permit holder considers any conflicts to be non-material.

   ii. **Regulator-initiated variation.** The Contractor or National Highways to produce and agree an environmental scheme in accordance with Article 68 of the DCO (as presented in Appendix A) to allow the Environment Agency to issue a regulator-initiated variation to the third-party permit.

Scenario 5 – Other construction works within third-party permit area

4.3.39 This scenario was developed to investigate the permit issues with undertaking construction works within an area with a third-party environmental permit. The construction works themselves are not waste operations or activities which would require an environmental permit (i.e. piling, foundations, site compounds, or excavation) but may clash with the extant permit and operational conditions of a third-party operator's permit.

4.3.40 An example of this would be at Ashfields Landfill where piling works may be required for heavy foundations, such as crane bases or batching plants as part of the site establishment. Such piling or ground improvement was not included in the operational conditions or techniques of the landfill permit, nor within the hydrogeological risk assessment produced to support their permit application.

4.3.41 This scenario is similar to Scenario 4 above, in that the Environment Agency has stated that no works can be undertaken without the consent of the third-party operator, and any agreement the operator would provide to the Project must also be in agreement with the Environment Agency.

4.3.42 Furthermore, any works undertaken, such as waste treatment or re-excavation are likely to involve a variation of the third-party permit, and any works that may penetrate the sidewalls or base of deposited waste must be accompanied by suitable assessments and monitoring to demonstrate that the risks of pollution are not exacerbated.

4.3.43 As explained in Scenario 4, a provision is included in Article 68 of the DCO to address conflicts with waste operations. In this instance, the provision will offer protection through providing the third-party notice to enable steps to be undertaken to ensure they can comply with their permit or the Contractor or National Highways will produce an environmental scheme in consultation with third-party permit holder(s) relating to DCO works being undertaken within their permit boundary.

4.3.44 Although this is subject to detailed design, it is likely that a phased approach of assessment will be required to assess the potential permit risks under this scenario, with a review of the construction activities proposed against the third-party permit conditions.

4.3.45 National Highways received advice during the course of the collaborative workshops from the Environment Agency that in addition to waste permit considerations, any works which may penetrate through the base/sidewalls of a landfill may also require a groundwater activity permit which may be a variation to the existing permit or a permit which is required by the Contractor.

4.3.46 It should be noted that regardless of the provision in the DCO, the Contractor will need to assess and mitigate any risks from pollution from their works as per commitments in the REAC and the CoCP [**Document Reference 6.3 ES Appendix 2.2 (9)**], and this would include the impacts on a third-party's operations.

Scenario 5 permit options:

a. No inconsistency or conflict with an existing permit. The Contractor to engage with the permit holder to determine whether inconsistencies may arise between the authorised works required for the DCO works and the existing third-party permit conditions and associated monitoring and management infrastructure. If no material inconsistencies are identified, then the Contractor shall give reasonable notice to the permit holder to enable appropriate steps to be taken to ensure the permit holder will be able to comply with their relevant permit conditions.

b. Inconsistencies or conflicts with third-party permit identified. Where conflicts are likely between the authorised works required for the DCO works and the existing third-party permit conditions and associated monitoring and management infrastructure, the likely options are considered to be:

i. **Third-party permit holder to vary their permit.** This option may be beneficial in the event that the conflicts are minor and the third-party permit holder considers any conflicts to be non-material. However, it is noted that the Project may prefer option ii) below to avoid programme or delivery risks.

ii. **Regulator-initiated variation.** The Contractor or National Highways to produce and agree an environmental scheme in accordance with Article 68 of the DCO (as presented in Appendix A) to allow the Environment Agency to issue a regulator-initiated variation to the third-party permit to account for the potential inconsistencies or conflicts with the existing third-party permit conditions and associated monitoring and management infrastructure.

5 North Portal permit options

5.1 Permit options

5.1.1 Based on the workshops and scenarios detailed above, the following permit options were developed for the construction works outlined in Section 3, for the complex waste scenarios around the North Portal.

5.1.2 It is proposed that the options below will present a basis for the Contractor to develop their permit solutions during detailed design. However, it should be noted that it will be the responsibility of the Contractor to obtain their permits required for the works, engage with existing third-party permit holders and where required, provide written schemes for approval to the Environment Agency. Through the detailed design process the Contractor may propose alternative approaches which would also be suitable.

5.1.3 Plate 3.3 indicates the permit areas and the DCO construction works within the North Portal area.

5.1.4 Plate 5.1 below has been taken from Environmental Statement Chapter 2: Project Description [**APP-140**] and illustrates the locations of the key construction locational activities around the North Portal area, along with the proposed construction programme, including periods of low, medium and high intensity activity.

Plate 5.1 Section B construction activities and timeline

5.1.5 The construction activities listed below in Table 5.1 are based on the assumed outline construction programme and are listed in order of the activity commencing, although it should be noted that the order and nature of the works are subject to detailed design by the Contractor.

5.1.6 For example, many of the activities below could be combined into a single permit. This permit could then be varied as the works progress and the activities change through the construction programme.

Table 5.1 Permit solutions for the North Portal area

Construction activity		Possible permit solutions
1	North Portal and construction compounds CA05 Access • Construction of haul road and substation base on Ashfields permit area.	Works are within temporary land acquisition area. Environmental permit options include: • variation of extant permit; • surrender of one or more of the landfill areas; and / or • demonstrate works do not impact extant permit with appropriate assessment or evidence as required. Note: groundwater activity permit may be required for any piling though the Ashfield landfill.
2	Advance Works - CA05 compound • CA05 compound (groundworks, hardstanding, cabins).	As above, and: • Additional environment permits may be required by Contractor for mobile plant, water treatment, piling, and surface water discharges for example as required during these activities.
3	North Portal common site works • Compound set-up assuming site levelling, groundworks, cabins, piling, hardstanding.	Permanent land acquisition area on Goshems Farm: • transfer and variation of Goshems DfR Permit to Contractors, if permit required; or • surrender of DfR Permit and new permit on permanent acquisition area, if permit required. Note: groundwater activity permit may be required for any piling within former Goshems landfill.
4	North Portal approach structure • Piling works along sides of ramp to tunnel portal, earthworks through Ashfields and Goshems Farm. Part of land acquisition area. • Groundwater control for earthworks associated with the excavation of the access ramp with associated discharge of water.	Permanent land acquisition area: • variation to existing Ashfields disposal permit to exclude permanent works areas, and partial surrender where required; • transfer / variation of existing DfR permit (Goshems) to Contractor, if permit required; or • surrender of Goshems Farm DfR and new Contractor permit(s) on Goshems area (linked to others above and below). Note: • Waste permitting solution linked to earthworks strategy and whether over excavation of wastes is required. • Contractor groundwater abstraction and discharge permits may also be required (see Appendix C).

Construction activity		Possible permit solutions
		• Storage of residual Pulverised Fuel Ash (PFA) excavated may be required for final landscaping on Open Mosaic Habitat for Tilbury Fields. • Groundwater activity permits may be required for piling through sidewall/base of landfill.
5	North Portal structure • Piling, diaphragm walling, excavation and groundwater control and associated discharge of water.	As above for Goshems Farm DfR area only.
6	Tunnelling and production of tunnel spoil. • Tunnelling activity generating waste tunnel spoil for treatment and processing and transfer to storage areas before placement. Plant likely to include slurry treatment plant, filter presses and water treatment plant.	New environmental permits may be required by the Contractor for treatment of the waste arising from the tunnelling works, including but not limited to mobile plant permits for slurry treatment plant, filter presses. Early engagement with the Environment Agency will be required to determine the types of permits (i.e. standard rules, bespoke or whether the activity could be exempt). Note: separate permits would be required for water discharges if required for the mobile plant activities.
7	Tilbury Fields landscaping • Works within permanent land acquisition area. • Placement of material on Tilbury Fields with final landscape layer to create Open Mosaic Habitat. • All works to be completed by Contractor design and build, and Contractor proposed as permit holder.	• Transfer and variation of Deposit for Recovery permit with updated Waste Recovery Plan to be undertaken by Contractor; or • Surrender of existing recovery permit and new Contractor DfR permit for placement of landscape material. Note: western end of Goshems Farm not within acquisition area and outside of Order Limits and subject to development by others.
8	Placement of surplus material in Ashfields Landfill	Note: area is mostly within temporary acquisition although access to Ashfields may be constrained by the CA05 compound and surrounding construction activities. • Permit variation (if required) to accept materials. • Part transfer or surrender of existing landfill permit and application for new landfill or RfD permit held by Contractor.

5.1.7 It is noted that all the environment permits required will need to be surrendered when the activities have been successfully completed, in agreement with the Environment Agency.

5.1.8 The approach to permit surrender will be discussed as part of detailed design depending on the permit type and the surrender obligations.

5.1.9 The activities listed above may also require other environmental permits not discussed in detail here, including groundwater activity permits for works within a landfill.

6 Third-party permits

6.1 Introduction

6.1.1 As mentioned above, the Project has the potential to impact on extant third-party environmental permits within the Order Limits. The nature and magnitude of impact depends on the type of activity being undertaken by the permit holder, and the location of the activity in relation to the proposed DCO works and land acquisition.

6.1.2 The focus has been on the waste-related permit and permitted installations within and adjacent to the Order Limits.

6.1.3 The permit implications are explored in Scenarios 4 and 5 above and National Highways understands that the Environment Agency's position is that no works can be undertaken within a third-party permit area without the consent of the third-party operator, and any agreement the operator would provide to the undertaker must also be in agreement with the Environment Agency.

6.1.4 Furthermore, National Highways understands that the Environment Agency may also require the third-party permit to be varied if there are any construction works which could impact on the third-party's permit conditions, including operating techniques and emissions monitoring.

6.1.5 As discussed above, the DCO contained a provision in Article 68 to address risks associated with third-party permits. In this instance, the amendment will offer protection to the third-party permit holder(s) through environmental schemes, permits surrenders and regulator-initiated variations relating to DCO works being undertaken within their permit boundary.

6.2 Register of third-party permits

6.2.1 A search of the publicly available permit and installation registers has been undertaken by the Project, which has been cross referenced with the Environment Agency records. Copies of all the environmental permits within or adjacent to the Project Order Limits have been catalogued.

6.2.2 The register of known extant third-party permits is presented in Appendix B (noting this is a live list).

6.2.3 To date, a number of landowners with known waste permits have been consulted with regard to the potential implication of the construction and operation of the Project, and the impacts of permanent land acquisition.

6.2.4 These extant operators and waste permits are as follows:

a. Veolia E S Cleanaway (UK) Ltd in relation to the Ockendon Landfill (EPR/NP3736GU)

b. Tarmac in relation to the Linford Landfill (EPR/DB3832RD/V002)

c. IVL in relation to Ashfields (EPR/GP3733DZ) and Goshems Farm (EPR/WP3094EP) (although there are other sites for which assessment is ongoing to determine whether there are any permit clashes with the Project)

d. Clearserve Limited in relation to Rainbow Quarry (EPR/XP3430LS/V002)

6.2.5 Further to the above, approximately 33 permits have been identified (including those mentioned above) which are within or adjacent to the Order Limits which may require further engagement and review by the Contractor during the detailed design phase.

6.2.6 The way forward for each permit holder is subject to the outcome of the engagement with each party and the Environment Agency. A selection of third-party permit options is presented below.

6.3 Third-party permit options

6.3.1 At the current time of the Project, the solutions to addressing third-party permit clashes may be best placed within additional commitments in the Stakeholder Actions and Commitments Register (SACR [**Document Reference 7.21 (7)**]) or through side agreements with the landowner.

6.3.2 It is not proposed to initiate any permit variations or other permit-related activities until the period following DCO grant and during the detailed design phase. In some instances, the permit clashes may be avoided through minor amendments to the design, therefore avoiding permit commitments.

6.3.3 It is recommended that the Environment Agency is consulted early in the detailed design phase regarding the proposed methodologies for addressing the third-party permit issues.

6.3.4 It should also be noted that the approach to addressing the third-party permit issues will be mitigated by Article 68 of the DCO, as detailed in Appendix A and in Scenarios 4 and 5.

6.3.5 The following sections present a non-exhaustive high-level list of potential options for addressing issues with extant third-party permit holders around operational conditions within their permits.

Conflicts with extant permit conditions

6.3.6 In some instances, the Project may not significantly interfere with the permitted activity but there may be conflicts or perceived conflicts with the permit conditions or operational conditions due to earthworks and construction works, permanent or temporary land acquisition, or changing baseline conditions at the permitted site. This could include:

a. interrupting access to areas of the permitted site

b. removing, or working in close proximity, to monitoring locations required by the permits (i.e. groundwater or gas monitoring wells)

c. changing drainage and surface watercourse alignments

d. causing conflicting conditions from overlapping activities (i.e. waste handling requirements for a third-party permitted site might be in conflict with the waste operation of a temporary construction area with a permit, such as temporary stockpiling or treatment), although this is discussed in more detail in Scenarios 4 and 5 at Section 6

6.3.7 In these instances, it may be possible to reach agreements with the third party and the Environment Agency to ensure the third party can still meet their permit obligations, and that there is no risk of enforcement during the Project construction phase in which case the undertaker would provide notice to any third-party permit holder to ensure appropriate steps are undertaken for them to comply with their permit.

6.3.8 However, as noted above, Article 68 in the DCO will also reduce the risk to third-party permit holders due to actions undertaken by the Project.

Permit surrenders

6.3.9 If a permit holder(s) activities are wholly within an area of permanent land acquisition, the Project may benefit from the permit being surrendered early in the programme prior to the commencement of construction works.

6.3.10 The surrender of the permit may be undertaken by the Project on behalf of the third party or in agreement by the third party.

6.3.11 This may be a favourable option in locations where the Project is seeking to permanently acquire a permit holder's land area, and the permit holder or the activity will cease to exist.

6.3.12 This option would require agreement with the Environment Agency that the permit can be surrendered and the requirements of any surrender application based on the permit type (inert landfill or non-inert for example).

Part surrender/variation

6.3.13 If a permit holder's activities are partially within the permanent land acquisition area, it may be feasible to either part surrender the permit or for the third party to vary their permit to reduce the permit area.

6.3.14 This is included in Article 68 of the DCO which can allow part surrender of land no longer required by the regulated facility as part of the Environment Agency's regulatory initiated variation (or otherwise) provided following consultation with the Environment Agency and the permit holder and approval by the Environment Agency.

6.3.15 Under the Landfill Directive this would normally require a physical barrier/separation to be present between the area subject to the surrender, or removed from the permit, and the remaining ongoing permit area.

6.3.16 Without a distinct physical boundary, the Environment Agency has stated that it would be very difficult to enforce the EPR at the remaining site, and hence this will need to be considered in discussions with the Environment Agency based on the permit type and the detailed design.

6.3.17 The solution will largely depend on the works, the permitted activity and the status of the activity at the time of construction works commencing and the relationship with the third party.

6.3.18 For example, a waste site may be fully restored but the permit is still active, in which case it would make sense to surrender the permit. However, there may be active sites within which the Project will have some land-take, and in this case, a variation or partial surrender may be a more suitable option.

Variation and transfers

6.3.19 In some instances, it might be beneficial to retain an existing environmental permit for use by the Project. For example, if there is a waste operation which can be used but lies within an area of temporary or permanent land acquisition. In this case, the Contractor may wish to seek a transfer of the permit to themselves and a variation to meet the requirements of the works.

6.3.20 In this case, it is assumed the transfer and variation will be undertaken by the Contractor and is potentially linked to the options in permit scenario 1 or 2 at Section 6 above.

6.3.21 This assumes that the third-party operator is cooperative and willing to vary or transfer their permit, and that this can be agreed with the Environment Agency.

7 Outline permit application approach

7.1 Introduction

7.1.1 This section summaries the outline permitting approach based on the proposed design and the stakeholder engagement to date. The approach is based on the standard environmental permitting application.

7.2 Engagement

7.2.1 As noted in Environmental Statement Appendix 2.2: CoCP [**Document Reference 6.3 ES Appendix 2.2 (9)**] the Project has been, and will continue to be, developed based on strong collaboration between its stakeholders. Any additional consents and agreements will be secured at relevant stages of the Project's development, as necessary.

7.2.2 The Contractor would have a Contractor Consents Manager who would have the responsibility for preparing, implementing, maintaining and updating a Consents Management Plan and Consents Register(s) and therefore it is expected that further information on the timings and nature of the permits required will be available as detailed design progresses.

Environment Agency

7.2.3 During the pre-examination and examination phases, the engagement comprised workshops between National Highways and key Environment Agency representatives from the National Permitting Service and Geoscience Operations Team.

7.2.4 The engagement strategy during the detailed design phase will be developed by the Contractor(s) Consents Manager.

Third-party operators

7.2.5 Ongoing engagement with third parties will be undertaken by National Highways. Following DCO award, the Contractor will be responsible for any further interactions with the stakeholders, in accordance with their own stakeholder engagement arrangements.

7.3 Permit application approach

7.3.1 The overarching strategy is presented below, but will be subject to detailed design and the Contractor(s) Consents Management Plan.

Pre-application discussions

7.3.2 The Environment Agency has highlighted through the engagement to date, that the pre-application discussions are essential in achieving a successful and timely permit.

7.3.3 The workshops undertaken to date have commenced some of the early pre-application process and demonstrated the permit options which may be feasible for the Contractor to develop further.

7.3.4 The Contractor will be responsible for the pre-application discussions for the permits required by the Project and hence would need to engage with the Environment Agency and relevant third-party permit holders at the earliest opportunity to discuss the various permits required, especially the complex waste-related permits.

7.3.5 Particularly with regard to Article 68 of the DCO, early engagement on the contents and format of the environmental scheme required to support any regulator-initiated permit variation is required.

7.3.6 The Contractor would produce the required investigations, risks assessments, plans and monitoring arrangements to support their permit applications.

Supporting evidence and documents for permit applications

7.3.7 The bespoke waste permits are likely to require significant assessments, reports and plans.

7.3.8 The contents of any environmental scheme are likely to require risk assessments and works plans although the contents of any supporting evidence should be confirmed during the pre-application discussions and ongoing review with the Environment Agency.

7.3.9 Supporting evidence can include environmental risk assessments, waste management plans, materials specifications, emissions monitoring plans, baseline monitoring data and restoration plans.

7.3.10 It should be noted that substantial information has already been collated by the Project to support the DCO process, and presence of this information should be used to support any new permit applications.

DCO works permit operator

7.3.11 The permit applicant will need to be the ‘legal entity’ that can be legally responsible for the permit and can accept liability. It is currently assumed that the permit applicant will be Contractor.

Third-party operator

7.3.12 Any variation or surrender applications required for third-party operations will be undertaken in accordance with Article 68 of the DCO, unless otherwise agreed.

7.3.13 As noted above, third-party permit variations will be on the basis of an environmental scheme submitted for approval to the Environment Agency by the undertaker and serving of regulator-initiated permit variations.

7.3.14 The undertaker may submit permit surrender applications on behalf of the third-party permit holder following consultation with the permit owner and the Environment Agency.

Duly made assessment (for new permits)

7.3.15 Following the environmental permit pre-application period, the permit application will be formally submitted to the Environment Agency for the duly made assessment to assess the application, conduct background checks on the permit applicant, check forms and fees.

7.3.16 For complex waste operations, including landfills, the Contractor may need to provide details of financial bonds or guarantees.

Determination period (for new permits)

7.3.17 It is understood the 'normal' timescales associated with a standard permit application are:

a. four months for a new permit application

b. three months to amend for surrender for a permit

c. two months to transfer a permit to a new operator

7.3.18 It is currently understood that there are constraints on the capacity of the National Permitting Service which can lead to significant lead in times for 'duly making' applications, and delays in the determination of complex applications.

7.3.19 The Environment Agency has stated that the determination period will also depend on the complexity of the application and the requirements for consultation by the Environment Agency. As stated above the Environment Agency has highlighted that pre-application discussions are very important in achieving a successful and timely permit.

7.3.20 However, the Project notes that NSIP permit applications can be prioritised if a reasonable case is made to the Environment Agency by the Project. This Permitting Strategy is intended to make that reasonable case for the Project.

Review period (for environmental scheme permit variations)

7.3.21 The Environment Agency has agreed to a 56 day review period for the environmental schemes required for regulator-initiated variations as described in Appendix A.

8 Summary and way forward

8.1 Summary

8.1.1 This document presents the Outline Environmental Permitting Strategy (OEPS) principally relating to the complex waste permits related to the DCO construction activities.

8.1.2 Of the environmental permits needed for the Project it is recognised that those required for using, treating and disposing of waste materials are the most complex. On that basis, this OEPS has been developed in collaboration with the Environment Agency to present a series of permit scenarios and associated permit options. It is proposed that these can be further developed by the Contractor at the appropriate stage of the Project.

8.1.3 Complex waste permits are considered at locations principally around the north and South Portal sites, although there are known third-party environmental permit interactions in Sections Section B: Tunnels and Approaches (Construction Zone B) (Tunnels and Approaches) and Section C: Roads North of the River Thames (Roads North of the Thames).

8.1.4 Section 4 above presents a detailed discussion on the identified permit scenarios and associated options which are summarised below. Detailed options for the North Portal site are presented in Section 5.

a. **Scenario 1** – this scenario was developed to provide details on timeframes and locations of construction works which may require environmental permits, and signposts the further detail presented in Environmental Statement Chapter 2: Project Description [**APP-140**].

b. **Scenario 2** – placement of surplus material in Ashfields Landfill. This scenario is complicated by the interaction with the extant third-party landfill permit operator and the future status of the operation at the time of the construction works. The identified permit options for the Contractor include agreeing a landfill variation with the operator or agreeing a transfer or surrender of the extant permit to allow the DCO works to proceed.

c. **Scenario 3** – placement of material on Goshems Farm to create Tilbury Fields. As above, this scenario is complicated by the potential interaction with extant third-party operations. It is proposed that the Project's preferred approach at this time would be to undertake the activities required to create Tilbury Fields under a Deposit for Recovery permit, subject to detailed design and agreement with the Environment Agency.

d. **Scenario 4** – Overlapping permit areas. The Project has included a provision in Article 68 of the DCO in agreement with the Environment Agency. The Environment Agency has confirmed that overlapping, multi-operator sites are possible and therefore the Project may apply for permits where extant permits are in place. However, this does leave risks of potential enforcement action to both operators should permit conflicts exist

or occur during the works, and hence regulator-initiated permit amendments of third-party permits may be needed based on agreed environmental schemes.

e. **Scenario 5** – Other construction works in third-party permit areas.
As with Scenario 4, this scenario references Article 68 in the DCO as the Environment Agency has confirmed that no works would be allowed within the third-party permit area without the consent of the operator and if conflicts are identified an environmental scheme and permit variation may be required.

8.1.5 The approach to third-party permits is presented in Section 6 above, with a register of third-party permits presented in Appendix B.

8.1.6 In summary, in agreement with third-party operators within the Order Limits, the Project may need third-party permits to be varied, transferred and/or surrender permits to allow the DCO construction works in accordance with EPR 2016 and Article 68 of the DCO.

8.2 Way forward

8.2.1 As noted in the objectives in Section 2.4, this strategy is currently intended to be a live document to provide the Environment Agency with a summary of the permitting strategy discussions to date.

8.2.2 This document has been updated following review by the Environment Agency during the examination period, and a record of the changes has been presented in Appendix E of this document.

8.2.3 It is the intention that this document is agreed with the Environment Agency by the end of the examination period.

References

Contaminated Land: Applications in Real Environments (CL:AIRE) (2011). The Definition of Waste: Development Industry Code of Practice. Version 2.

Department for Transport (2014). National Policy Statement for National Networks.

Environment Agency (2023). Guidance – Waste recovery plans and deposit for recovery permits. Accessed December 2023. https://www.gov.uk/government/publications/deposit-for-recovery-operators-environmental-permits/waste-recovery-plans-and-deposit-for-recovery-permits.

Planning Inspectorate (2019). Advice Note 11 Annex D. Accessed 31 March 2022. https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/an11-annexd/.

Glossary

Term	Explanation
Alignment	The alignment is the horizontal and vertical route of a road, defined as a series of horizontal tangents and curves or vertical crest and sag curves, and the gradients connecting them.
AOD	Above ordnance datum, vertical datum used by an ordnance survey as the basis for delivering altitudes on maps.
AONB	Area of Outstanding Natural Beauty: Statutory designation intended to conserve and enhance the ecology, natural heritage and landscape value of an area of countryside.
BGS	British Geological Survey: a partly publicly funded body which aims to advance geoscientific knowledge of the United Kingdom landmass and its continental shelf by means of systematic surveying, monitoring and research.
M25	Orbital motorway, 17.8 miles (28.6 km) east south-east of London's centre.
CoCP	Code of Construction Practice
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs: the government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities in the United Kingdom of Great Britain and Northern Ireland.
DfR	Deposit for Recovery
DMRB	Design Manual for Roads and Bridges: A comprehensive manual (comprising 15 volumes) which contains requirements, advice and other published documents relating to works on motorway and all-purpose trunk roads for which one of the Overseeing Organisations (National Highways, Transport Scotland, The Welsh Government or the Department for Regional Development (Northern Ireland)) is highway authority. The DMRB has been developed as a series of documents published by the Overseeing Organisations of England, Scotland, Wales and Northern Ireland. For the Lower Thames Crossing the Overseeing Organisation is National Highways.
DoWCoP	Definition of Waste Code of Practice
EA	Environment Agency: The Environment Agency was established under the Environment Act 1995, and is a Non-Departmental Public Body of Defra. The Environment Agency is the leading public body for protecting and improving the environment in England and Wales. The organisation is responsible for wide-ranging matters, including the management of all forms of flood risk, water resources, water quality, waste regulation, pollution control, inland fisheries, recreation, conservation and navigation of inland waterways.
EMP	Environmental Management Plan
EPR	Environmental Permitting (England and Wales) Regulations 2016 (as amended)
EU	European Union: A politico-economic union of 28 member states located primarily in Europe.
GIS	Geographic information system: an integrated collection of computer software and data used to view and manage information about geographic places, analyse spatial relationships, and model spatial processes.

Term	Explanation
HRA	Habitats Regulations Assessment: A tool developed by the European Commission to help competent authorities (as defined in the Habitats Regulations) to carry out assessment to ensure that a project, plan or policy will not have an adverse effect on the integrity of any Natura 2000 or European sites (Special Areas of Conservation, Special Protection Areas and Ramsar sites), (either in isolation or in combination with other plans and projects), and to begin to identify appropriate mitigation strategies where such effects were identified.
HyRA	Hydrogeological Risk Assessment
IVL	Ingrebourne Valley Ltd
LTC	Lower Thames Crossing: a proposed new crossing of the Thames estuary linking the county of Kent with the county of Essex, at or east of the existing Dartford Crossing.
Mainline	The through carriageway of a road as opposed to a slip road or a link road at a junction Mardyke A small river, mainly in Thurrock, that flows into the River Thames at Purfleet, close to the QEII Bridge.
NPPF	National Planning Policy Framework: published in March 2012 by the UK's Department of Communities and Local Government, consolidating over two dozen previously issued documents called Planning Policy Statements (PPS) and Planning Policy Guidance Notes (PPG) for use in England.
NPS	National Policy Statement (see NPSNN, NPS EN-1, NPS EN-4 and NPS EN-5)
NPSNN	National Policy Statement for National Networks: The NPSNN sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects on the national road and rail networks in England. It provides planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State.
NSIP	Nationally significant infrastructure project: major infrastructure developments in England and Wales, such as proposals for power plants, large renewable energy projects, new airports and airport extensions, major road projects etc.
OEPS	Outline Environmental Permitting Strategy
oMHP	Outline Materials Handling Plan
oSWMP	Outline Site Waste Management Plan
PFA	Pulverised Fuel Ash
PLA	Port of London Authority: a self-funding public trust established by The Port of London Act 1908 to govern the Port of London. Its responsibility extends over the Tideway of the River Thames and its continuation (the Kent/ Essex strait). It maintains and supervises navigation, and protects the river's environment.
REAC	Register of Environmental Actions and Commitments
SAC	Special Area of Conservation: defined in the European Union's Habitats Directive (92/43/EEC), also known as the Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora. SACs are to protect the 220 habitats and approximately 1000 species listed in annex I and II of the directive which are considered to be of European interest following criteria given in the directive.
SACR	Stakeholder Actions and Commitments Register

Term	Explanation
SEB(s)	Statutory Environmental Body(ies): Any principal council as defined in subsection (1) of section 270 of the Local Government Act 1982 for the area where the land is situated. Where the land is situated in England; Natural England, Historic England, the Environment Agency, Natural Resources Wales and the National Assembly for Wales where, in the opinion of the Secretary of State, the land is sufficiently near to Wales to be of interest to them and any other public authority which has environmental responsibilities and which the Secretary of State considers likely to have an interest in the scheme.
SPA	Special Protection Area: A designation under the European Union Directive on the Conservation of Wild Birds.
SPZ	Source protection zone: EA-defined groundwater sources (2000) such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area.
SRN	Strategic Road Network, the core road network, managed in England by National Highways.
SSSI	Site of Special Scientific Interest: A conservation designation denoting an area of particular ecological or geological importance.
SuDS	A sustainable drainage system designed to reduce the potential impact of new and existing developments with respect to surface water drainage discharges.
SWMP	Surface Water Management Plan: Plan to provide sufficient information to support the development of an agreed strategic approach to the management of surface water flood risk within a given geographical area by ensuring the most sustainable measures are identified.
TBM	Tunnel boring machine, machine used to excavate tunnels with a circular cross section.
TfL	Transport for London: created in 2000, the integrated body responsible for London's transport system.
WFD	Water Framework Directive: A European Community Directive (2000/60/EC) of the European Parliament and council designed to integrate the way water bodies are managed across Europe.

Appendix A DCO Article 68

A.1 Interface with waste operation permits

A.1.1 Drafting has been included in the DCO relating to how the Project interfaces with third-party Environmental Permits for waste operations (Article 68 of Part 7 that amends the EPR). The drafting is presented below.

Provision for existing waste operation permits

68.—(1) Before the undertaker carries out an authorised activity which would give rise to inconsistency or conflict with an existing permit, it may–

(a) consult the Environment Agency and the permit holder on a draft environmental scheme,

(b) amend that scheme as appropriate to take into account of representations received; and

(c) submit the final scheme to the Environment Agency, and serve a copy of that scheme on the permit holder,

but if the undertaker decides not to submit an environmental scheme, it must give reasonable notice to any permit holder to enable appropriate steps to be taken to ensure it continues to be able to comply with its permit.

(2) The Environment Agency must within 56 days (or such other period as the undertaker and the Environment Agency may agree) of receipt of the final scheme under subparagraph (1)(c) make a regulator initiated variation to the relevant existing permit.

(3) The Environment Agency must, subject to its duties under the 2016 Regulations, ensure that the regulator initiated variation referred to in paragraph (2) –

(a) allows the authorised activity to be carried out in accordance with the environmental scheme; and

(b) minimises the need for any future variations to the existing permit arising from an authorised activity.

(4) In relation to a regulator initiated variation made pursuant to this article, the 2016 Regulations are to be construed so that–

(a) regulation 20(2) does not apply where the Environment Agency (or, in the case of an appeal, the appropriate authority) agrees that the conditions in paragraph 14(1)(a) and (b) of Schedule 5 to the 2016 Regulations are satisfied by the environmental scheme;

(b) where a regulator initiated variation made pursuant to this article includes provision to reduce the extent of the site of a regulated facility, an application for a surrender of a permit in respect of land which, by virtue of that variation, is no longer the site of a regulated facility will not be required;

(c) paragraph 8 of Schedule 5 to the 2016 Regulations does not apply;

(d) paragraph 9 of Schedule 5 to 2016 Regulations does not apply so as to require notice to be served on the undertaker;

(e) both the undertaker and the permit holder have a right of appeal under regulation 31(1)(c)(i);

(f) if the Environment Agency fails to comply with paragraph (2), the undertaker may serve a notice under paragraph (1) of Schedule 6 of the 2016 Regulations and the undertaker may then appeal under regulation 31(1)(a), as if the failure were a refusal of an application under the Regulations;

(g) the appropriate authority for the purposes of regulation 31 is the Secretary of State for Transport;

(h) the permit holder shall be served with a copy of an appeal made by the undertaker within 14 days of it being lodged and shall have the right to make representations and appear at the appeal as an interested party; and

(i) no requirements relating to publicity of an appeal apply.

(5) Charges that would otherwise apply to a regulator initiated variation under the charging scheme are substituted by a requirement for the undertaker to pay to the Environment Agency its reasonable costs incurred in connection with paragraphs (1) to (3) of this article.

(6) Regulation 25 of the 2016 regulations is to be construed to allow the undertaker to make an application, following consultation with the permit owner and the Environment Agency, to surrender in whole or in part an existing permit in respect of land which has been, or is proposed to be, compulsorily acquired by the undertaker under this Order.

(7) If a surrender application is made under paragraph (6) the undertaker must pay the surrender application charge that would otherwise have been payable by the permit holder under the charging scheme and regulation 31 of the 2016 Regulations is construed so that the undertaker may exercise the appeal rights associated with the application in place of the permit holder.

(8) In the case of a surrender application under paragraph (6) or a determination under paragraph 4(a) the requirement in paragraph 14(1)(b) of Schedule 5 to the 2016 Regulations is to be construed so that regard is also had to the use of the site subject to the application in connection with an authorised activity.

(9) Nothing in this article affects–

(a) the requirement under the 2016 Regulations for a regulated facility to be authorised by an environmental permit; or

(b) the right of a permit holder to make an application for a variation or surrender of an environmental permit under the 2016 regulations.

(10) In this article—

“2016 Regulations” means the Environmental Permitting (England and Wales) Regulations 2016 and unless otherwise specified, expressions used in this article have the same meaning as in the Regulations;

“authorised activity” means any works or activities authorised by this Order, works carried out in connection with the authorised development, or the exercise by the undertaker of functions conferred by this Order;

"charging scheme" means the Environment Agency (Environmental Permitting and Abstraction Licensing) (England) Charging Scheme 2022, and includes any subsequent amendment to that scheme or any new scheme;

"environmental scheme" means a written scheme containing appropriate measures to ensure –

(a) the continued effective operation of the existing permit;

(b) the methods to be used to remove or separate existing waste from land subject to an existing permit or land on which an authorised activity is carried out;

(c) monitoring of land, air and water, equivalent to that required under existing permit and measures relating to surrender which arise as a result of an authorised activity;

(d) continued access arrangements, including in relation to monitoring, for the permit holder in connection with land retained by the permit holder which remains subject to the existing permit and

(e) an equivalent level of environmental protection to that which would be provided by either the existing permit or permit conditions complying with Schedules 7, 9 and 10 of the Regulations; and

"existing permit" means any environmental permit in respect of a waste operation whether granted under the 2016 regulations (or any predecessor or substituted regulations) before or after the coming into force of this Order granted by the Environment Agency on or over the Order limits, excluding any environmental permit obtained by the undertaker.

Appendix B Third-party permits

B.1 Register of third-party permits

B.1.1 The register of third-party permits was produced in June 2023 based on public registers of waste activities and installations. The permitted sites below are those with addresses within or adjacent to the Order Limits. The assessment does not include groundwater activities, discharge consents, mobile plant permits etc., and does not include those Part B activities which are regulated by the local authorities.

B.1.2 For each entry, a commentary has been added with potential options in relation to the third-party permit.

Name	Initial review of permit location in relation to Order Limits		Permit type and Reference		Potential permit conflict identified
	Within	Outside			
CLEARSERVE LIMITED, Rainbow Shaw Quarry, Holford Road, Linford, Essex, SS17 0PJ	✓	✓	L05: Inert LF	XP3430LS	Areas of permanent, temporary permanent access required for land within permit boundary. Excavation of deposited waste for Project cutting. Potential conflict with restoration and surrender of permit.
S WALSH & SON LIMITED, Port Of Tilbury London, Tilbury Freeport, Tilbury, RM18 7EH		✓	A16: Physical Treatment Facility	KB3209CF	Outside Order Limits. Very unlikely conflict between scheme and permit.
CLEARSERVE LIMITED, Rainbow Shaw Quarry, Holford Road, Linford, Stanford Le Hope, Essex, SS17 0PJ		✓	A16: Physical Treatment Facility	ZP3598NX	Temporary possession of land and permanent acquisition of rights. Very limited overlap of Order Limits and permit boundary which is unlikely to impact on operations.
S WALSH & SON LIMITED, Port Of Tilbury London Limited, Tilbury Freeport, Tilbury, Essex, RM18 7EH		✓	S0905 No 5: Inert & Excavation WTS	PB3933DJ	Outside Order Limits and not active permit. Unlikely conflicts between scheme and permit.
R J D LIMITED, Mill House Farm Agricultural Reservoir, High House Lane, Chadwell St Mary, Thurrock, Essex, RM18 8TP		✓	S1539 No 39: Use of waste in a deposit for recovery op	AB3604FS	Unlikely conflict between scheme and permit although need to check whether there are any access constraints based on DCO works.

Name	Initial review of permit location in relation to Order Limits		Permit type and Reference		Potential permit conflict identified
	Within	Outside			
EUROPEAN METAL RECYCLING LIMITED, 13-20 Berth, Tilbury Dock, Tilbury, Essex, RM18 7EH		✓	A20 : Metal Recycling Site (mixed MRS's)	VP3094NK	Unlikely conflict between scheme and permit although need to check whether there are any access constraints based on DCO works.
ENVA WOOD RECYCLING MANCHESTER LIMITED, Tilbury Docks, Tilbury, Essex, RM18 7HB		✓	SR2011 No4: Treatment of waste wood <75000 tps	BB3332AE	Unlikely conflict between scheme and permit although need to check whether there are any access constraints based on DCO works.
THURROCK COUNCIL, Land/premises At, Buckingham Hill Road, Linford, Essex, SS17 0PP		✓	A13 : Household Waste Amenity Site	CP3299NL	Civic amenity site adjacent to order limits for NDEP land. Unlikely conflict between scheme and permit.
PORT OF TILBURY LONDON LIMITED, Leslie Ford House, Tilbury Freeport, Tilbury, Essex, RM18 7EH		✓	A11 : Household, Commercial & Industrial Waste T Stn	EP3501UC	Outside Order Limits. Unlikely conflict between scheme and permit.
INGREBOURNE VALLEY LIMITED, Goshems Farm, Station Road, East Tilbury, Tilbury, Essex, RM18 8QR	✓	✓	A25 : Deposit of waste to land as a recovery operation	WP3094EP	Within permanent land acquisition for Tilbury Fields. Permit transfer, surrender or variation may be required in liaison with third-party and Environment Agency. Permit options considered in Section 4 of the OEPS
INGREBOURNE VALLEY LIMITED, Tilbury Power Station, Tilbury Ash Disposal Site, Fort Road, West Tilbury, Tilbury, Essex, RM18 8UJ	✓	✓	Installation: Waste Landfilling; >10 T/D With Capacity >25,000T Excluding Inert Waste - 5.2 A(1) a) Recovery Or A Mix Of Recovery And Disposal Of > 75 T/D Non-Hazardous Waste (> 100 T/D If Only AD) Involving	EPR/ GP3733DZ	Part temporary and part permanent land acquisition. Permit transfer, surrender or variation may be required in liaison with third-party and Environment Agency. Permit options considered in Section 4 of the OEPS.

Name	Initial review of permit location in relation to Order Limits		Permit type and Reference		Potential permit conflict identified
	Within	Outside			
			Treatment Of Slags And Ashes - 5.4 A(1) b) (iii)		
T & S ENVIRONMENTAL LIMITED, Thames House, St. Andrews Road, Tilbury, RM18 7EH		✓	S0809 No 9: Asbestos Waste Transfer Station	WE2751AA/ A001	Outside Order Limits. Unlikely conflict between scheme and permit.
BLUE PHOENIX LIMITED, Port of Tilbury Berth 36-38, Tilbury, Essex, RM187EH		✓	A15 : Material Recycling Treatment Facility	BB3239RD	Outside Order Limits. Unlikely conflict between scheme and permit.
SOUTHFIELDS GRAVEL COMPANY LIMITED, Land/premises At, Brentwood Road, Orsett, Essex, RM16 3BS		✓	A5 : Landfill taking Non-Biodegradable Wastes	FP3099NS	Temporary possession of land and permanent acquisition of rights for utilities works. Very limited overlap of Order Limits and permit boundary which is unlikely to impact on operations.
VEOLIA ES CLEANAWAY (UK) LIMITED, Area 1, Medebridge Road, South Ockendon, Grays, Essex, RM16 5TZ	✓	✓	A1 : Co-Disposal Landfill Site	SP3999NT	Possible areas of conflict with operational and historical permits, monitoring and surface water management infrastructure. To be considered as part of ES Veolia whole site. Permit variations considered unlikely assuming access to monitoring and drainage infrastructure maintained.
VEOLIA ES CLEANAWAY (UK) LIMITED Medebridge Road, South Ockendon, Grays, Essex, RM16 5TZ		✓	A1 : Co-Disposal Landfill Site	UP3699NU	
VEOLIA ES LANDFILL LIMITED, Ockendon Landfill, Ockendon Area II & III Landfill - EPR/NP3736GU, Medebridge Road, GRAYS, Essex, RM16 5TZ	✓	✓	Installation: Waste Landfilling; >10 T/D With Capacity >25,000T Excluding Inert Waste - 5.2 A(1) a) Directly Associated Activity (Included) Disposal Of > 50 T/D Non-	EPR/ NP3736GU	

Name	Initial review of permit location in relation to Order Limits		Permit type and Reference		Potential permit conflict identified
	Within	Outside			
			Hazardous Waste (> 100 T/D If Only Ad) Involving Biological Treatment - 5.4 A(1) a) (i)		
S WALSH & SON LIMITED, The East Tilbury Quarry, Princess Margaret Road, East Tilbury, Essex, RM18 8PH		✓	A6 : Landfill taking other wastes	BP3599NK	Outside Order Limits. Unlikely conflict between scheme and permit.
S WALSH & SON LIMITED, The East Tilbury Quarry, Princess Margaret Road, East Tilbury, Essex, RM18 8PH		✓	A6 : Landfill taking other wastes	BP3299NS	Outside Order Limits. Unlikely conflict between scheme and permit.
TARMAC BUILDING PRODUCTS LIMITED Linford Landfill, Buckingham Hill Road, Linford, Stanford Le Hope, Essex, SS17 0PY	✓	✓	L05 : Inert LF	DB3832RD	Areas of permanent and temporary land acquisition within permit boundary. Excavation of deposited waste required for Project cutting within landfill. Likely conflict with operation, monitoring and restoration and surrender of permit. Permit may require variation and / or part surrender.
URM (UK) LIMITED Shed 46, Port Of Tilbury, Tilbury Freeport, Tilbury, Essex, RM19 7EH		✓	A15 : Material Recycling Treatment Facility	EB3606HC	Outside Order Limits. Unlikely conflict between scheme and permit.
PORT OF TILBURY LONDON LIMITED Leslie Ford House, Tilbury Freeport, Tilbury, Essex, RM18 7EH		✓	A14 : Transfer Station taking Non-Biodegradable Wastes	FB3805KA	Outside Order Limits. Unlikely conflict between scheme and permit.
RECYCLED IN ORSETT LIMITED Dansand Quarry, Stanford Road, Orsett, Grays, Essex, RM16 3BB	✓	✓	SR2010 No12: Treatment of waste to produce soil <75,000 tpy	NP3696EG	Minor areas of permanent, temporary, and permanent access right within permit boundary. Standard rules permit may require variation for site boundary.

Name	Initial review of permit location in relation to Order Limits		Permit type and Reference		Potential permit conflict identified
	Within	Outside			
S WALSH & SON LIMITED East Tilbury Quarry, Princess Margaret Road, East Tilbury, Essex, RM18 8PH		✓	A25 : Deposit of waste to land as a recovery operation	CB3609HV	Outside Order Limits. Unlikely conflict between scheme and permit.
S WALSH & SON LIMITED East Tilbury Quarry, Princess Margaret Road, East Tilbury, Essex, RM18 8PH		✓	L05 : Inert LF	SP3439LE	Outside Order Limits. Unlikely conflict between scheme and permit.
INGREBOURNE VALLEY LIMITED Orsett Quarry Ecological Park, Buckingham Hill Road, Stanford-le-hope, Thurrock, Essex, SS17 0PP		✓	A25 : Deposit of waste to land as a recovery operation	DB3102UX	Outside Order Limits. Unlikely conflict between scheme and permit.
INGREBOURNE VALLEY LIMITED Orsett Quarry Expansions, Buckingham Hill Road	✓	✓	N/A	N/A	Temporary possession of land and permanent acquisition of rights may conflict with proposed scheme but at the time of writing there is no operational facility or permit at the location.
EUROPEAN METAL RECYCLING LIMITED Low Street Brickworks, Station Road, East Tilbury, Essex, RM18 8QR		✓	A20: Metal Recycling Site (mixed MRS's)	HP3547QK	Outside Order Limits. Unlikely conflict between scheme and permit.
VIRIDOR WASTE MANAGEMENT LIMITED, Ockendon Landfill Site, Ockendon Power Plant EPR/LP3236XH, Medebridge Road, Grays, Essex, RM16 5TZ	✓		Installation: Directly Associated Activity (Standalone)	EPR/ LP3236XH	Outside Order Limits. Unlikely conflict between scheme and permit although site is within the larger ES Veolia site at Ockendon.
EDL (UK) LFG GENERATION LIMITED, Mucking Landfill Site, Mucking Generation Plant EPR/TP3538UB, Mucking Wharf Road, Stanford-Le-Hope, Essex, SS17 0RN		✓	Installation: Directly Associated Activity (Standalone)	EPR/ TP3538UB	Outside Order Limits. Unlikely conflict between scheme and permit.

Name	Initial review of permit location in relation to Order Limits		Permit type and Reference		Potential permit conflict identified
	Within	Outside			
ENOVERT SOUTH LIMITED, Mucking Landfill Site, Mucking Landfill - EPR/QP3730DW, Mucking Wharf Road, Stanford-Le-Thorpe, Essex, SS17 0RN		✓	Installation: Waste Landfilling; >10 T/D With Capacity >25,000T Excluding Inert Waste - 5.2 A(1) a)	EPR/ QP3730DW	Outside Order Limits. Unlikely conflict between scheme and permit.
TURNER MOTOR RECYCLING LIMITED, Unit 3, Folkes Lane, Little Tabrams, Upminster, Essex, RM14 1TH		✓	S1517 No 17: Vehicle Depollution Facility	JB3907UN	Outside Order Limits. Unlikely conflict between scheme and permit.

Appendix C Abstraction Licences and Discharge Consents

C.1 Register of known abstraction licences and discharge consents

C.1.1 Following discussions with the Environment Agency the following tables present the understanding of licence and consent requirements in relation to water abstractions and discharges at the time of writing.

Table C.1 Water abstraction requirements

Type	Name / Location / water body	Licence	Maximum Abstraction	Source of Information	Licence / Permit Requirement	Construction / Operation
Existing groundwater abstraction	Boreholes, wells and adits at Three Crutches Pumping Station (PS), Shorne (Chalk aquifer)	Southern Water Services Ltd 9/40/01/0511/G	Part of a large group licence for 17,700ML per year	ES Appendix 14.5	Public Water Supply No modification of existing licence required	N/A
Existing groundwater abstraction	Boreholes, wells and adits at Hazells PS, Northfleet (Chalk aquifer)					
Existing groundwater abstraction	Linford Well (Chalk Well)	Northumbrian Water Ltd 8/37/56/*G/0044	Part of a group licence shared with Stifford. Linford has a peak daily licence of 6.4ML per day	ES Appendix 14.5	Public water supply abstraction not currently in use. Proposed as water supply for the tunnel boring machine (with Northumbrian Water Ltd remaining the licence holder) No modification of existing licence required.	Construction for TBM. Operation back to public water supply as required by licence holder.

Type	Name / Location / water body	Licence	Maximum Abstraction	Source of Information	Licence / Permit Requirement	Construction / Operation
Existing groundwater abstraction	Low St., East Tilbury (Chalk aquifer)	8/37/56/*G/0073 [RWE Generation UK PLC]	Aggregated daily quantity of 5,500 m^3/day	ES Appendix 14.5	Public water supply abstraction No modification of existing licence required.	Construction and operation
Existing groundwater abstraction	Well 1 at Polwicks, West Tilbury (Fluvial sands and gravels)	8/37/56/*G/0006 [C H COLE & SONS]	Part of a combined licence of 1,300m^3/day	ES Appendix 14.5	Public water supply abstraction No modification of existing licence required.	Construction and operation
Existing groundwater abstraction	Botney Farm, Orsett (Fluvial sands and gravels, reassessed as Harwich Formation)	8/37/56/*G/0032 [C H COLE & SONS]	5m^3/day	ES Appendix 14.5	Public water supply abstraction No modification of existing licence required.	Construction and operation
Existing groundwater abstraction	Hobletts Farm, Orsett (Fluvial sands and gravels, reassessed as Harwich Formation)	8/37/56/*G/0032 [C H COLE & SONS]	5m^3/day	ES Appendix 14.5	Public water supply abstraction No modification of existing licence required.	Construction and operation
Existing groundwater abstraction	Castles Farm, Orsett (Fluvial sands and gravels, reassessed as Harwich Formation)	8/37/56/*G/0032 [C H COLE & SONS]	16m^3/day	ES Appendix 14.5	Public water supply abstraction No modification of existing licence required.	Construction and operation

Type	Name / Location / water body	Licence	Maximum Abstraction	Source of Information	Licence / Permit Requirement	Construction / Operation
Existing groundwater and surface water abstractions Proposed new groundwater abstraction.	Mill House Reservoir. Groundwater abstraction from Ockendon Side Hill pond.	Move groundwater licence 8/37/56/*S/0085/R01 Add new groundwater abstraction licence Surface water licence 8/37/55/20	127,272m^3/year (existing) New licence TBC	Discussions ongoing with licence holder.	New and amended licences as necessary to mitigate impacts of construction. Scope under discussion with licence holder.	Construction and operation
Proposed surface water abstraction. Possible impoundment licence (TBC).	Coal House Point HRA mitigation area.	New licence application	>20m^3/d	Scope under development.	New surface water abstraction from River Thames. Possible impoundment licence required to manage ponds	Construction and operation. Licence required prior to main works at the North Portal.
Proposed groundwater abstraction	North Portal construction site	New licence application	> 20m^3/day	ES Appendix 14.5 - Annex K North Portal groundwater model.	North Portal groundwater control. New groundwater abstraction licence required**.**	Construction

Table C.2 Water discharge requirements

Type	Name / Location / water body	Consent	Discharge requirement	Source of Information	Licence / Permit Requirement	Construction / Operation
Proposed surface water Discharge	Northern tunnel entrance compound water will be discharged to the River Thames (for dewatering)	New discharge consent	Discharge of water from the North Portal construction compound.	ES Appendix 14.5 Linked REAC RDWE023 and RDWE02	Discharge consent to the River Thames is necessary through new discharge pipeline and outlet.	Construction.
Proposed surface water Discharge	Southern tunnel entrance compound water will be discharged to the River Thames through ditch network in the Ramsar site.	New discharge consent	Discharge of water from the North Portal construction compound.	ES Appendix 14.5 Linked REAC RDWE033	Discharge consent to the ditches in the Ramsar site.	Construction
Proposed surface water discharges	Project general: site compound and utilities.	New discharge consents	Discharge of surface water runoff from construction compounds.	1- ES Appendix 14.5 Linked REAC RDWE006	Case by case discharge permit may be required for managing surface water runoff across work sites	Construction
Highway runoff to ground	Infiltration Basin 1. East side of the A2 junction, along the M2	n/a	Highway runoff.	Drainage plans HE540039-CJV-BOP-SZZ_DN100000_-DR-CD-10001 ES Appendix 14.5 states will have no	No discharge consent required (Memorandum of Understanding between the EA and Highways agency Annex 1 - Water Environment)	Operation
Highway runoff to ground	Infiltration Basins 2 to 4. A2 junction.					

Type	Name / Location / water body	Consent	Discharge requirement	Source of Information	Licence / Permit Requirement	Construction / Operation
Highway runoff to ground	South Portal Drainage. Infiltration basins 5 and 6.			environmental impact.		
Highway runoff to surface watercourse	North portal drainage during the operation.					
Highway runoff to surface watercourse	Attenuation Basin 1. Land south of Cole's Pond.					
Highway runoff to surface watercourse	Attenuation Pond 4. North of Linford.					
Highway runoff to ground	Infiltration basin 7. A13 junction.					
Highway runoff to surface watercourse	Attenuation Ponds 5, 6 and 8. North of A13 junction.					
Highway runoff to surface watercourse	Attenuation Ponds 10 and 11. South of M25 junction.					
Highway runoff to surface watercourse	Attenuation Ponds 13 and 14. North of M25 junction.					

Appendix D Stakeholder Engagement

D.1 List of workshops between Lower Thames Crossing and the Environment Agency

D.1.1 Workshop 1 (Ref: HE540039-CJV-EGN-GEN-MIN-ENV-00019)

a. Initial meeting to present outline contents for a permit strategy.

b. Discussions around permit ownership and permit approach.

D.1.2 Workshop 2 (Ref: HE540039-LTC-EGN-GEN-MIN-ENV-00002)

a. EA presentation of standard environmental permit approach.

b. Initial presentation of the permit strategy approach for the North Portal.

c. Presentation of permit scenarios.

D.1.3 Workshop 3 (Ref: HE540039-LTC-EGN-GEN-MIN-ENV-00013)

a. Introduction to EA permit specialists.

b. Review of North Portal construction activities.

c. Updated permit scenarios.

D.1.4 Workshop 4 (Ref: HE540039-LTC-EGN-GEN-MIN-ENV-00014)

a. Review of multioperation sites with more than one permit holder operating in same area.

b. Review of DoWCoP options for Tilbury Fields.

c. Updated permit scenarios.

D.1.5 Workshop 5 (Ref: HE540039-LTC-EGN-GEN-MIN-ENV-00015)

a. Further discussions around use of DoWCoP for Tilbury Fields, confirmation.

b. EA confirmation that more than one permit can exist in the same areas, and more than one activity can be included in one permit.

c. Updated permit scenarios.

D.1.6 Workshop 6 (Ref: HE540039-LTC-EGN-GEN-MIN-ENV-00017)

a. Detailed presentation of Tilbury Fields landscape proposals.

b. EA confirmation DoWCoP cannot be used at Tilbury Fields.

c. EA confirmation that Deposit for Recovery permit would be suitable, noting essential ecological mitigation of Tilbury Fields could meet substitution test and would need to be demonstrated in new Waste Recovery Plan.

d. EA noted waste recovery permit could be issued for Ashfields if all PFA were extracted and landfill permit surrendered.

D.1.7 Workshop 7 (Ref. HE540039-LTC-EGN-GEN-MIN-ENV-00018)

a. Presentation of earthworks at South Portal and Chalk Park. Proposed route under DoWCoP materials management plan and not waste permits.

b. Discussion regarding third-party permits.

c. Detailed review of North Portal permits risk.

D.1.8 Workshop 8 (Ref: HE540039-LTC-EGN-GEN-MIN-ENV-00019)

a. Introduction to Coal House Point wetlands.

b. Third-party permits updates.

c. North Portal updates with a run through the detailed construction works and likely permit options.

D.1.9 Workshop 9 (Ref: HE540039-LTC-EGN-GEN-MIN-ENV-00020)

a. Updated on Coal House Point and discussion around permit requirements and timeframes.

b. Discussion around technical queries raised by bidders.

c. Update status of third-party permits.

d. Update on permit strategy (OEPS).

D.1.10 Workshop 10 (HE540039-LTC-EGN-GEN-MIN-ENV-00021)

a. Update on OEPS

b. Review of written representations and discussion on landfill piggy-backing.

c. Update on abstraction licences and discharge consents.

D.1.11 Workshop 11 (HE540039-LTC-EGN-GEN-MIN-ENV-00022)

a. Run through Environment Agency comments on OEPS

b. Updated CHP abstraction rates.

D.2 Other Stakeholder Engagement

D.2.1 Other workshops undertaken with Statutory Environmental Bodies (SEBs) relating to permitting during the early application stage of the Project are listed in Table D.1 of 5.4.1.1 Statement of Common Ground between (1) National Highways and (2) the Environment Agency [**APP-094**]; Table D.1 of 5.4.1.5 Statement of Common Ground between (1) National Highways and (2) the Marine Management Organisation [**APP-098**]; Table D.1 of 5.4.1.6 Statement of Common Ground between (1) National Highways and (2) Natural England [**APP-099**]; and Table C.2 of 5.4.1.7 Statement of Common Ground between (1) National Highways and (2) Port of London Authority [**APP-100**].

D.2.2 The various topics which have been covered by these workshops which are relevant to environmental permitting are as follows:

a. Requirement, Secondary Consents and Permits

b. Landfill site east of Goshems Farm/North Portal area known as East Tilbury Landfill

c. Options for surface water disposal

d. Surface water drainage along the A2

e. Required consents and timelines

f. Water Framework Directive (WFD) scoping note

g. Waste and contamination

h. Discharge of tunnel effluent to main river

i. Material reuse and transportation of materials

j. Stockpiling regulatory requirements

k. Approach to long-term stockpiling and reuse of excavated materials, along with permitting requirements

l. Pumping test consents

m. Discharge consents and trigger levels

n. Material permitting advice

o. Discharge licence information

p. Potential outfalls into the Thames/Tilbury Main

q. DCO Control Plan

r. Protective Provisions and the draft DCO

s. Permitting strategy

t. Water and contamination assessments, including, ConSim modelling of the East Tilbury Landfill, the Hydrogeological Risk Assessment (HyRA), the Flood Risk Assessment (FRA), and potential enhancements to the West Tilbury Main

u. Dewatering discharge proposals

D.2.3 For reference, the final Statements of Common Ground (SoCGs) with the SEBs have been submitted as follows:

a. Environment Agency SoCG [**Document Reference 5.4.1.1 (5)**]

b. Marine Management Organisation SoCG [**Document Reference 5.4.1.5 (3)**]

c. Natural England SoCG [**Document Reference 5.4.1.6 (6)**]

d. Port of London Authority SoCG [**Document Reference 5.4.1.7 (2)**]

Appendix E Record of updates during consultation

Table E.1 Comments received from Environment Agency (29 September 2023)

LTC - Outline Environmental Permitting Strategy (DRAFT)		
Section	**Comments / Notes from MSW**	
2.1.4	This section doesn't mention water abstraction licences, it is likely these will be required for the construction works, for example de-watering operations, dust Suppression etc. It is mentioned though in section 2.3.2. Where the treatment of materials is carried out in accordance with a Mobile Plant Licence, any subsequent point source discharge will require a separate permission. The treatment of waters arising from construction activities, including point source discharges resulting from the treatment of materials regulated by mobile plant licence will require a new bespoke water discharge permit. This section also doesn't mention flood defence consents or land drainage consents. Is this because the DCO will be the principal consenting mechanism for these types of consents? It does reference APP-058 and this reference does mention land drainage but not flood consents. Section 2.2.7 covers disapplication in respect to flood risk activities.	
2.1.6	Yes, but to be exact it would be a waste operation and/or an installation, we do need to differentiate as an installation for example will be affected by Industrial Emissions Directive, additional regulations that would need to be taken into account.	
Advisory	How will the project affect any Part B activities which are regulated by local authorities? There is no mention in this document so has this been looked at and will this be dealt with separately?	
3.2.1	Material re-use of site won soils would be planned in accordance with the Definition of Waste Development Industry Code of Practice (CL:AIRE, 2011) and controlled via a Materials Management Plan (MMP) and other documents referenced in 3.2.3. Also see Plate 3.1 Control Plan	
3.2.6	Re. 'these other permit applications will be supported by the various detailed controls, commitments and mitigation measures which are secured in the DCO application', can you give examples?	
3.3.5	It would be good to reference the likely examples of the exemptions that the project will need to register e.g. • Using waste such as exemptions that cover operations such as using waste in construction, spreading waste materials on the land such as U1 and U10. • Disposing of waste exemptions (D1 to D8) are unlikely.	

LTC - Outline Environmental Permitting Strategy (DRAFT)		
Section	**Comments / Notes from MSW**	
	• Treating waste (exemptions T4, T5, T6, T9, T10 and T12) These cover operations such as preparing, recovering, sorting and treating certain waste materials. Storing waste (exemptions S1 and S2), these cover storing certain waste materials in secure containers or at secure sites. Each exemption has specific limits and conditions which must be complied with. There are no water exemptions that are appropriate for the project. Some low-risk water discharge and groundwater activities can be exempt from requiring a permit if they meet certain conditions, however, these are discharges of sewage effluent or septic tank discharges to surface water.	
Advisory	There are some exemptions that do not need to be registered. If you store your own waste temporarily, or operate a waste collection point, you may not need to register an exemption. However, you must still meet certain limits and conditions. Waste exemptions are changing and this will affect anyone who carries out a waste exemption activity. Defra has published its consultation supplementary response document and associated annexes explaining these changes. It sets out which exemptions will be withdrawn or restricted. We expect changes to the exemptions will start to roll out during 2024 and continue into 2025 but timescales have not been finalised yet.	
3.5.8	Typo in c. landscape	
4.3.3 / 4.3.6	How many? It says further information on the timings and nature of the permits required will be available as detailed design progresses. As soon as this is known NPS can plan.	
4.3.10	Additives used to stabilise and improve the geotechnical properties of the material: As part of any application a report would need to be provided that assessed each of the additives so as to ensure the additives will not have an impact on groundwater or surface water. We would also need to know what the appropriate quantity is in line with the manufacturer's protocols. You will need to discuss this with the Environment Agency regarding what would be expected in such an assessment. We also need to be satisfied that the waste containing tunnelling additives will be classified as non-hazardous. You would need to satisfactorily demonstrate using the appropriate methods detailed in Environment	

LTC - Outline Environmental Permitting Strategy (DRAFT)		
Section	**Comments / Notes from MSW**	
	Agency's guidance WM3 that that the waste containing the additives would be characterised as non-hazardous. Presumably it would as these are likely to be present in the waste in very low concentrations, however you still need to demonstrate this. Guidance on the classification and assessment of waste (1st Ed. v1.1), Technical Guidance WM3 (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/719394/Waste-classification-technical-guidance-WM3.pdf)	
4.3.12 a.	Unlikely, as you say it comes down to quantity, waste types, 17 05 04 is restricted to certain additives only and only from the Tideway tunnel. Plus the restoration, surface water management, impact of high pH, HRA, stability, remaining improvement conditions and impact on monitoring infrastructure etc., all need to be assessed. This is not an exclusive list.	
4.3.12 d.	Agreed, scenario 2, 4.2.12 d needs further discussion. The site is operational and has not entered the aftercare period. Presumably LTC are referring to part surrender as well. (iv) Recovery may be able to be agreed for infilling into empty cell/ void if that infilling provides a benefit, for example, engineering or stability, etc.	
4.3.19	Agreed	
4.3.21	It is worthwhile considering the benefits of the proposed Tilbury Fields development in relation to any application for a DfR permit.	
4.3.22	Agreed – the status of the Goshems Farm & Ashfields Landfill permits, including who is the permit holder, will influence how the Tilbury Fields deposit will be permitted.	
4.3.23	Agreed, scenario 3 needs further discussion	
4.3.31	Scenario 4 Protected Provisions – needs discussion.	
4.3.41 and 6.1.5, 6.3.4, 6.3.8	LTC are saying the Protected Provisions (EPR Amendment) offers protection to third party permit as well. Amendment to EPR and the ramifications needs discussion.	
4.3.44 a/b	Scenario 5 needs further discussion	
Table 5.1	Phrase 'agree de minimis works with EA' needs discussion. Can you put a reference column down the left side of this table so we can make references to the rows more clearly? 2nd row CA05 compound – you make reference to 'plant / lagoons / discharges', can you expand on what you mean by these in terms of permits and exemptions. 3rd row – what is meant by 'Mobilisation, site levels'. 4th row – refers to piling.	

LTC - Outline Environmental Permitting Strategy (DRAFT)		
Section	**Comments / Notes from MSW**	
	5th row – 'storage of residual Pulverised Fuel Ash (PFA) excavated will be required for final landscaping on open mosaic habitat for Tilbury Fields' needs further explanation. 6th row – further explanation required. 7th row – 'New permits required by MWC for works (filter presses, STP, etc.)' it would be good if you could provide more detail so we can work out exactly what type of permit or Standard Rules or exemption is required. Also can you say at what stage of the project each permit would be needed, that way we can get an idea on those permits that need to be prioritised first.	
5.1.8	Noted	
	Third Party Permits	
6.3.3	Noted	
6.3.12	Noted	
6.3.14 /15	Landfill Directive requirement – will need further discussion	
7.3.2	Early pre-application discussions essential	
7.3.9	This was also mentioned earlier in the strategy plan, unsure what is meant by 'tests'.	
7.3.12	The determination time will depend on a number of factors, such as the complexity of the application or whether we need to consult.	
8 Summary		
Appendix A, A1.1	It would be useful if you could add a column to detail which section of the works these third party permits are located. So as in Plate 3.2 add in Sections A, B or C as appropriate. Also it would be good to have two further columns which detailed the likely impact on the third party permit and the likely resolution.	

Table E.2 Comments received from the Environment Agency 8 November 2023

LTC - Outline Environmental Permitting Strategy v2.0	
Section v2.0	Comments / Notes from MSC
2.2.7	Concrete/bitumen plants – is this a waste activity? Unless you mean concrete crushing and storage / treatment / transfer of waste concrete and bitumen? When you say 'outside the scope of this strategy document' I have assumed you are referring to where these activities are to be located, in which compound etc the detail to be provided later, by MWC.
2.2.9	Noted that these are the most likely exemptions, as there are others that may be applicable.
2.2.3	Noted
2.3.5 – 2.3.7	Article 68 – Separate discussion
2.4.7	Extra 'as' in 'and beyond'
2.4.8	Noted
4.3.11 to 4.3.13	Noted
Scenario 2	Surely there is an e) You have not explained the implications of Article 68 on Scenario 2. Presumably LTC are waiting on the agreement of Article 68 and then the implications will be better understood.
Scenario 3	As above Article 68. Both Scenario 2 and 3 are affected by Article 68.
Scenario 4	Article 68 has been included here but not for 2 or 3. Need to discuss this at the meeting.
4.3.24	Noted
4.3.45	Typo remove 'a' before deposited waste.
Scenario 5	Maybe this addresses my comments in Scenarios 2 and 3 above? Let's discuss this at the meeting.
5.1.7	Noted
7.2.2	Noted
Appendix A	Noted

Table E.3 Record of updates to document

Commented Section	Strategy Updates
P01 Version	
2.1.4	Appendix B added to include abstractions and discharges. Text updated in 2.1.4 to 2.1.6 to include water activities and mobile plant permits. Reference to flood risk permits and land drainage included in updated Section 2.3, noting these activities are covered in the DCO and the relevant protective provisions for the Environment Agency and the Local Drainage Boards.
2.1.6	Text amended to include 'and / or an installation'.
Advisory comment on Part B activities.	Noted. Paragraph added to Section 2.4 to clarify Part B permits are not included in this strategy.
3.2.1	Text referred to is largely taken from Chapter 2 of the ES and control plan reproduced in Plate 3.1. No change to text.
3.2.6	Noted. Reference to REAC and CoCP included. Numerous mitigation measures included and hence not reproduced herein.
3.3.5	Noted and additional text added. For editorial purposes the details in this section have been moved to Section 2.2 and Section 2.2 has been reorganised to include additional details on the permit background. Reference to SoCG included in relation to water discharge in operation.
Advisory on exemptions and changes to exemptions.	Noted. New text added to Section 2.2.
3.5.8	Noted and typo corrected.
4.3.3 / 4.3.6	Noted. The number and type of permit will be determined during detailed design. Reference is provided to Section 7 outlining the Contractors requirements from the CoCP. Reference also provided to Chapter 2 of the ES which includes a high level programme for the construction activities for the scheme.
4.3.10	Noted. Additional text added in relation to additives and Environment Agency guidance.
4.3.12 a)	Noted. At the current time we do not know the nature of the arisings. However, text in this Section 4.3 has been updated to note that additives are only likely required for the stabilisation of the Chalk slurry.
4.3.12 d)	Text updated to reflect Environment Agency comment.
4.3.21	Noted. Furthermore addition text added to clarify the RfD permit requirements with links provided to the guidance.
4.3.22	Noted.
4.3.23	Noted. Further discussions undertaken. Clarification on the tests / requirements for an RfD permit added as noted above.

Commented Section	Strategy Updates
4.3.31, 4.3.41, 4.3.44a/b, 6.1.5, 6.3.4, 6.3.8	The text associated with the former protective provisions has been updated throughout the strategy to reflect the new Article 68 included in the DCO. We note that this is still under discussion with the Environment Agency and may be subject to change.
Table 5.1.	Table updated to include changes. Additional text included in early sections to explain use of PFA. Text also updated to reflect change in previous sections. New plate added to demonstrate construction sequencing.
6.3.14/15	Updated to include 'Landfill Directive'.
7.3.2	Noted and 'essential' added to text.
7.3.9	Text updated to refer to permit requirements. Noting that the planning permission test for any permit application will be the DCO itself.
7.3.12	Noted and additional text added to the section.
Appendix A	New column added to reflect potential permit conflicts for each third-party permit. Location of permits not included but locations are available through the public registers.
P02 Version	
2.2.7	Text amended to remove reference to bitumen and concrete plants.
2.4.7	Amended as per suggestion.
4.3.45	Amended as per suggestion.
References to article 68.	The proposed DCO drafting is now removed from the document and placed in Appendix A. Appendix A has been updated with the agreed working. Other sections have been updated to reference Appendix A. Various sections of text have been updated to reflect the agreed wording in Appendix A.

Annex C.17 Environment Agency's acceptance of the outline Environmental Permitting Strategy

creating a better place for
people and wildlife

Environment Agency

[redacted]

Our ref: KT/2023/131150/02-L01
Your ref: Lower Thames Crossing

Date: 05 December 2023

Dear [redacted]

Outline Environmental Permitting Strategy, Lower Thames Crossing

Thank you for consulting us on the above document.

The Environment Agency can accept the principle of the Outline Environmental Permitting Strategy. This is on the basis that it is a framework for permitting and is a live document which will change in future in light of further pre-application permitting discussions, which will be ongoing. It should be noted that all permit and consenting solutions are subject to detailed design, and that the Strategy may change as further information becomes available.

The need for environmental permits and abstraction licences is also noted in the Consents and Agreements Position Statement. [REP6-014] and Code of Construction Practice [REP6-038].

Please do not hesitate to contact us should you require any further information.

Yours sincerely

[redacted]

Annex C.18 Adaptive Design Technical Note

Lower Thames Crossing

Adaptive Design

Technical Note

Climate Change Adaptability

DATE: December 2023
DEADLINE: 9A

VERSION: 2.0

Lower Thames Crossing

Adaptive Design

List of contents

Page number

List of plates

Page number

List of tables

Page number

1 Introduction

1.1 Context

1.1.1 This document provides further information in relation to the Flood Risk Assessment (the FRA) for the A122 Lower Thames Crossing (the Project).

1.1.2 The FRA forms Appendix 14.6 of the Environmental Statement [**APP-460 to APP-464, REP1-171, APP-466 to APP-468 and REP7-130**].

1.2 Basis of the FRA

1.2.1 The FRA submitted for the Development Consent Order (DCO) application was undertaken on the basis that:

a. The Project would become operational in 2030.

b. The Project would have an operational life of 100 years (i.e. up to 2130).

c. A residual uncertainties allowance (freeboard) of 1.0m would be applied to the North Portal tidal flood protection.

1.3 Objective

1.3.1 The FRA was compliant with the prevailing flood risk guidance at the time of writing and was accepted by the Environment Agency. However, more recent amendments to flood risk guidance have not been taken into account. Further details of the changes are described in detail below.

1.3.2 Also, some of the baseline data used to prepare the FRA changed after the FRA was prepared, with revised design Extreme Water Levels (EWLs) in the Thames Estuary being the most significant. Changes to the baseline data are detailed further below.

1.3.3 In light of emerging policy and the new information released after the DCO application was submitted, the purpose of this Technical Note is to undertake a sensitivity check of how the proposed flood protection measures around the North Portal could be adapted over the lifetime of the Project to remain resilient to:

a. A credible maximum climate change scenario (if realised in the future)

b. A design horizon of greater than 100 years

1.3.4 It is not the intention of this note to provide the actual adaptive design solution; however, it demonstrates that a range of feasible measures are available based on today's understanding of climate change and construction methods.

2 National guidance

2.1 Introduction

2.1.1 National guidance on the following subjects is provided in this section:

a. Credible maximum climate change

b. Project lifetime

c. Adaptive approach

2.2 Credible maximum climate change

2.2.1 The Environment Agency's latest guidance on climate change for flood risk assessments (Environment Agency, 2022) states that for Nationally Significant Infrastructure Projects (NSIPs), it may be necessary to assess the flood risk for a credible maximum climate change scenario. The guidance goes on to note that the relevant national policy statement should be checked to determine whether this scenario should be assessed.

2.2.2 The Environment Agency guidance notes that the assessment of the credible maximum scenario should be treated as a 'sensitivity test'. This will help to assess how sensitive a development is to changes in the climate for different future scenarios and will help to ensure the development can be adapted to large-scale climate change over its lifetime.

2.2.3 Government policies for development of NSIPs on the national road and rail networks in England are set out in the National Policy Statement for National Networks (NPSNN) (Department for Transport, 2014). The NPSNN does not specifically require the credible maximum scenario to be assessed.

2.2.4 A draft version of the updated NPSNN (Department for Transport, 2023) states that the applicant should be able to demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario; this is set out in paragraph 4.37 of the draft NPSNN.

2.2.5 Further to paragraph 2.2.4 and by way of clarification, paragraph 1.16 of the draft NPSNN states '*The 2023 amendments will therefore have effect only in relation to those applications for development consent accepted for examination after the designation of those amendments.*' The provisions of the draft will therefore not apply to the Project for the purposes of section 104 of the Planning Act 2008.

2.3 Project lifetime

2.3.1 The latest planning practice guidance for flood risk (Department for Levelling Up, Housing and Communities, 2022) states that residential developments can be assumed to have a lifetime of at least 100 years and non-residential developments to have a lifetime of at least 75 years.

2.3.2 The guidance goes on to note that where development has an anticipated lifetime significantly beyond 100 years, such as some major infrastructure projects, it may be appropriate to consider a longer period for the lifetime of

development when assessing the potential impacts of climate change on flood risk.

2.3.3 Development lifetime is not stipulated in the NPSNN (2014 version or 2023 draft update), Environment Agency guidance or the Design Manual for Roads and Bridges (DMRB).

2.3.4 BS EN 1990 (British Standards Institution, 2004) sets out the principles and requirements for safety, serviceability, and durability of structures in construction engineering works. For bridges and other civil engineering structures, the standard stipulates a 'design working life' of 120 years. This standard is applicable to all civil engineering structures included in the Project.

2.3.5 In the absence of appropriate lifetime data, the design working life for civil engineering structures of 120 years has been adopted as the lifetime of the Project for the purposes of this Technical Note.

2.3.6 Based on an opening date of 2032, this would generate a design horizon of 2152 for assessment of flood risk.

2.4 Adaptive approach

2.4.1 The Environment Agency's climate change guidance notes that some measures to manage flood risk are not necessary now but may be in the future.

2.4.2 The adaptive approach considers the ease with which existing flood defences can be enhanced at a later date to protect against large-scale climate change.

2.4.3 Quantifying the ease with which existing flood defences can be enhanced is subjective but in the context of the Project, it is assumed that ease would be assessed with consideration to:

a. Constructability of the enhancements

b. Maintaining operation of the highway

2.4.4 Constructability would need to be considered during the detailed design stage with passive provision made for enhancing the flood defences at a later date if required.

2.4.5 To maintain operation of the highway, adaptive measures would need to be undertaken in a way that would not require full carriageway closures[1].

[1] It should be noted lane closures and speed restrictions may be necessary to provide safe working conditions during implementation of the enhancements.

3 Flood levels

3.1 Design presented in the DCO application

3.1.1 For the design presented in the DCO application, the crest level of the defences around the North Portal was estimated to be 7.83mAOD.

3.1.2 This is based on a 0.1% annual exceedance probability (AEP) EWL event for 2130 with a 1.0m residual uncertainties (freeboard) allowance.

3.2 Credible maximum fluvial flood levels

3.2.1 The credible maximum fluvial flood level is based on the 0.1% AEP event with the upper end river peak flow allowance applied.

3.2.2 The Environment Agency guidance only provides river peak flow allowance data up to 2125. In the absence of climate change allowances for 2130, the 2125 figures were adopted for the purposes of the FRA. The upper end peak flow allowance for the 2070s epoch (2061 to 2125) for the South Essex management catchment is 48%[2].

3.2.3 From the above, it follows that there is not a peak river flow allowance for the extended design horizon of 2152. However, as the crest level of defences around the North Portal is substantially higher than the credible maximum fluvial flood level for 2130 (*circa* 5.5m higher), it is assumed that the credible maximum fluvial flood level for 2152 will not overtop the defences.

3.2.4 A summary of the credible maximum fluvial flood levels in Tilbury Main watercourse (derived by the Project with hydraulic modelling as detailed in Part 5 of the FRA [**APP-464**]) is presented in Table 3.1.

Table 3.1 Credible maximum fluvial flood level

Credible maximum fluvial flood level (mAOD)	
2132 (FRA)	**2152**
2.33 (Note 2)	> 2.33 (Note 3)

Notes

1 The credible maximum fluvial flood level is based on the 0.1% AEP event with a 48% peak river flow allowance.

2 Derived from hydraulic modelling. The FRA hydraulic modelling assumed a design lifetime of 2130. As climate change allowances are only specified up to 2125, the FRA modelling applied 2125 peak river flow allowances to simulate the 2130 flood level (refer to footnote 2). Following this approach, the 2132 modelled flood level would be the same as the 2130 modelled flood level.

3 There is insufficient data to determine the credible maximum fluvial flood level for 2152 as the peak river flow climate change allowances are not specified beyond 2125.

*4 The derivation of the credible maximum fluvial level allowance is detailed in Parts 5 and 6 of the FRA [**APP-464**, **REP1-171**].*

[2] In Guidance on Adapting to climate change: guidance for risk management authorities (Environment Agency, 2016), it suggests that for changes beyond the 2080s, the 2080 peak river flow allowances should be assumed. Although this guidance has been superseded, this principle is followed here.

3.2.5 The order of magnitude of the increase in fluvial flood level is likely to be a matter of centimetres rather than metres, and it is highly improbable that it would exceed 5.5m (i.e. the crest level of the defences minus the 2130 fluvial flood level).

3.2.6 Given that the probable difference between the 2152 fluvial flood level and the crest level of the North Portal tidal defences is significant, the need for adaptive works is considered unlikely.

3.3 Credible maximum sea level

3.3.1 For the credible maximum scenario, the following criteria are considered:

a. The H++ climate change allowances for sea level rise

b. The upper end allowance for peak river flow

c. An additional 2mm for each year on top of sea level rise allowances from 2017 for storm surge

3.3.2 Based on the parameters in place at the time of the DCO submission, the H++ EWL at the North Portal for 2130 was estimated to be 7.28mAOD.

3.3.3 Since the DCO application was submitted, the following new information relevant to flood risk has become available:

a. The Environment Agency has provided updated River Thames Estuary EWL data.

b. The Environment Agency has published a revised Thames Estuary 2100 (TE2100) Plan.

c. A ministerial statement issued by the Secretary of State for Transport on 9 March 2023 states that the government intends to delay the construction of the Project by two years (Secretary of State for Transport, 2023). The construction completion date has therefore been pushed back to 2032.

3.3.4 This new information has resulted in an increase in the credible maximum sea level at the North Portal[3].

3.3.5 A summary of the credible maximum sea levels for 2130 (applied in the DCO application FRA) and 2152 (applying an extended design horizon of 120 years) are presented in Table 3.2.

[3] Further details on the revised levels resulting information published after the DCO application was submitted are included in Annex C.13 of the 5.4.1.1 Draft Agreed Statement of Common Ground between (1) National Highways and (2) the Environment Agency [REP7-102]

Table 3.2 Credible maximum sea level

Credible maximum sea level (H++ with surge)	2130		2152	
	Credible maximum flood level (mAOD)	Protection level (mAOD)	Credible maximum flood level (mAOD)	Protection level (mAOD)
DCO application FRA parameters	7.28	8.28	Not applied	Not applied
Revised parameters	7.99(1)	8.99	8.54(2)	9.54(2)

Notes

[1] For comparison with the DCO application FRA value, this value is for a future barrier at the existing Thames barrier location.

[2] These levels are based on latest H++ EWLs for the TE2100 Long Reach future barrier option (worst case). The existing Thames barrier option gives an H++ EWL of 8.43mAOD.

3.3.6 The protection level for the 2152 credible maximum sea level of 9.54mAOD is 1.71m higher than the 7.83mAOD crest level of the North Portal defences in the design presented in the DCO application.

3.3.7 Adaptive measures may be required to raise the North Portal defences by up to 1.71m to make them resilient for the credible maximum sea level for a design horizon of 120 years.

4 Adaptive works

4.1 Adaptive measures

4.1.1 Some parts of the design presented in the DCO application would afford a level of protection that is above the credible maximum level for 2152. These elements are detailed in Table 4.1 and illustrated in Plate 4.1 and Plate 4.2.

4.1.2 Adaptive works that could be implemented to make the North Portal resilient to the credible maximum event for 2152 are detailed in Table 4.2 and illustrated in Plate 4.1 and Plate 4.2.

4.1.3 The assessed level of potential adaptive works is 9.54mAOD (see Table 3.2).

Table 4.1 Project elements that would not require adaptive works for the credible maximum climate change scenario

Ref ID	Element	Description
DCO-1	Mainline	The mainline emerges from the tunnel at Chainage 6+476m[4] (North Portal) at a level of 5.4mAOD and rises until it reaches the railway line (Tilbury Loop). At Chainage 7+517m[5], the mainline will reach the flood protection level of 9.54mAOD. From this point onwards, the mainline will be above the flood protection level.
DCO-2	This element comprises the following: bridge over mainline 2 nr. Roundabouts higher section – northbound on-slip and off-slip higher section – southbound on-slip and off slip higher section – emergency access road higher section – service road	These elements are all above 9.54mAOD.
DCO-3	North Portal landscaping	The landscaping around the North Portal will vary in height but would have an elevation of 9.54mAOD or greater.

4 Chainage extrapolated using the mainline profile detailed in Drawing HE540039-CJV-BOP-SZA_RX000000_-DR-CH-10004.
5 Chainage extrapolated using the mainline profile detailed in Drawing HE540039-CJV-BOP-SZA_RX000000_-DR-CH-10005.

Table 4.2 Project elements potentially requiring adaptive works for the credible maximum climate change scenario

Ref ID	Element	Description
AW-1	Northbound on-slip	The flood protection at the northbound on-slip, as presented in the design submitted for the DCO application, would need to be enhanced (elevated and extended) in order to achieve a protection level of 9.54mAOD. If required, protection here could be provided by building a bund or forming a flood protection wall in the land between the on-slip and the emergency access road (see Plate 4.5 and Notes 2 and 3). Protection could also be achieved by infilling the valley between the emergency access and mainline and then supplementing the fill with landscaping to provide the required level of protection.
AW-2	Southbound off-slip	The flood protection at the southbound off-slip, as presented in the design submitted for the DCO application, would need to be enhanced (elevated and extended) in order to achieve a protection level of 9.54mAOD. If required, protection here could be provided by forming a flood protection wall to the east of the off-slip (see Plate 4.5 and Notes 2 and 3). Protection could also be provided by reforming part of the highway embankment to the east of the off-slip. By increasing the level of the embankment to the east of the road, this will effectively create a false cutting (see Plate 4.3 and Notes 2 and 3). In In order to raise the level of the embankment whilst retaining slope stability, the toe of the reformed embankment would need to be extended eastwards. This extension would be into land that would be retained by National Highways (the Applicant) (permanent acquisition), thereby avoiding the need for any third party land negotiations if the need to adapt the protection arises. As the embankment currently lies in the floodplain, any extension would result in a loss of floodplain storage, for which compensation would be required (see Note 4).

Ref ID	Element	Description
AW-3	Service road	Only a small section of the service road lies above 9.54mAOD. To ensure that the service road remains operational during a major flood event, adaptive measures may be required to protect the section of the road lower than 9.54mAOD. If required, protection could be provided by increasing the elevation of the road or providing a bund on either side of it (see Notes 2 and 3). The strip of land either side of the service road is to be retained by the Applicant (permanent acquisition). The width of retained land either side of the road is approximately 7.5m to 8.0m. Adaptive works would be undertaken in the retained land, thereby avoiding the need for any third-party land negotiations if the need to adapt the protection arises. The service road crosses West Tilbury Main towards its northern end. Adapting the bridge could be achieved by raising the level of the parapet walls.
AW-4	Mainline protective works – northbound	The flood protection along the northbound mainline, as presented in the design submitted for the DCO application, would need to be enhanced (elevated and extended) in order to achieve a protection level of 9.54mAOD. The flood protection in the design presented in the DCO application could be constructed as a vegetated green wall. An example of how adaptive works could be achieved on a vegetated retaining wall is shown in Plate 4.4 (see also Notes 2 and 3).

Ref ID	Element	Description
AW-5	Mainline protective works – southbound	The flood protection along the southbound mainline, as presented in the design submitted for the DCO application, would need to be enhanced (elevated and extended) in order to achieve a protection level of 9.54mAOD. If required, protection here could be provided by forming a flood protection wall immediately to the east of the on-slip (see Note 2 and Plate 4.3). Flood protection in the design presented in the DCO application could be constructed as a vegetated green wall. An example of how adaptive works could be achieved on a vegetated retaining wall is shown in Plate 4.4 (see also Notes 2 and 3). Protection could also be provided by reforming the part of the highway embankment to the east of the mainline. By increasing the level of the embankment to the east of the road, this will effectively create a false cutting (see Note 2 and Plate 4.3). The toe of the reformed embankment would need to be extended eastwards by approximately 12m. This extension would be into land that would be retained by the Applicant (permanent acquisition), thereby avoiding the need for any third party land negotiations if the need to adapt the protection arises. As the embankment currently lies in the floodplain, any extension would result in a loss of floodplain storage, for which compensation would be required (see Note 4).
N/A	Emergency access road	The emergency access road would not be operational during a major flood event as the existing ground levels at its junction with Station Road would be vulnerable to flooding.

Notes

[1] Examples of precast concrete flood walls and vegetated wall systems are presented in Annex A.

[2] The form of any adaptive works would depend upon the Delivery Partner's preferred method of constructing the defences required under the Project.

[3] The form of any adaptive works would depend upon the planning and legislative environment in place when undertaking any required works.

[4] If additional flood compensation cannot be secured to offset the volume of floodplain storage lost to the embankment, alternative adaptive measures would need to be investigated (e.g. by forming a flood wall as shown in Plate 4.5).

Plate 4.1 Adaptive works – Sheet 1 of 2

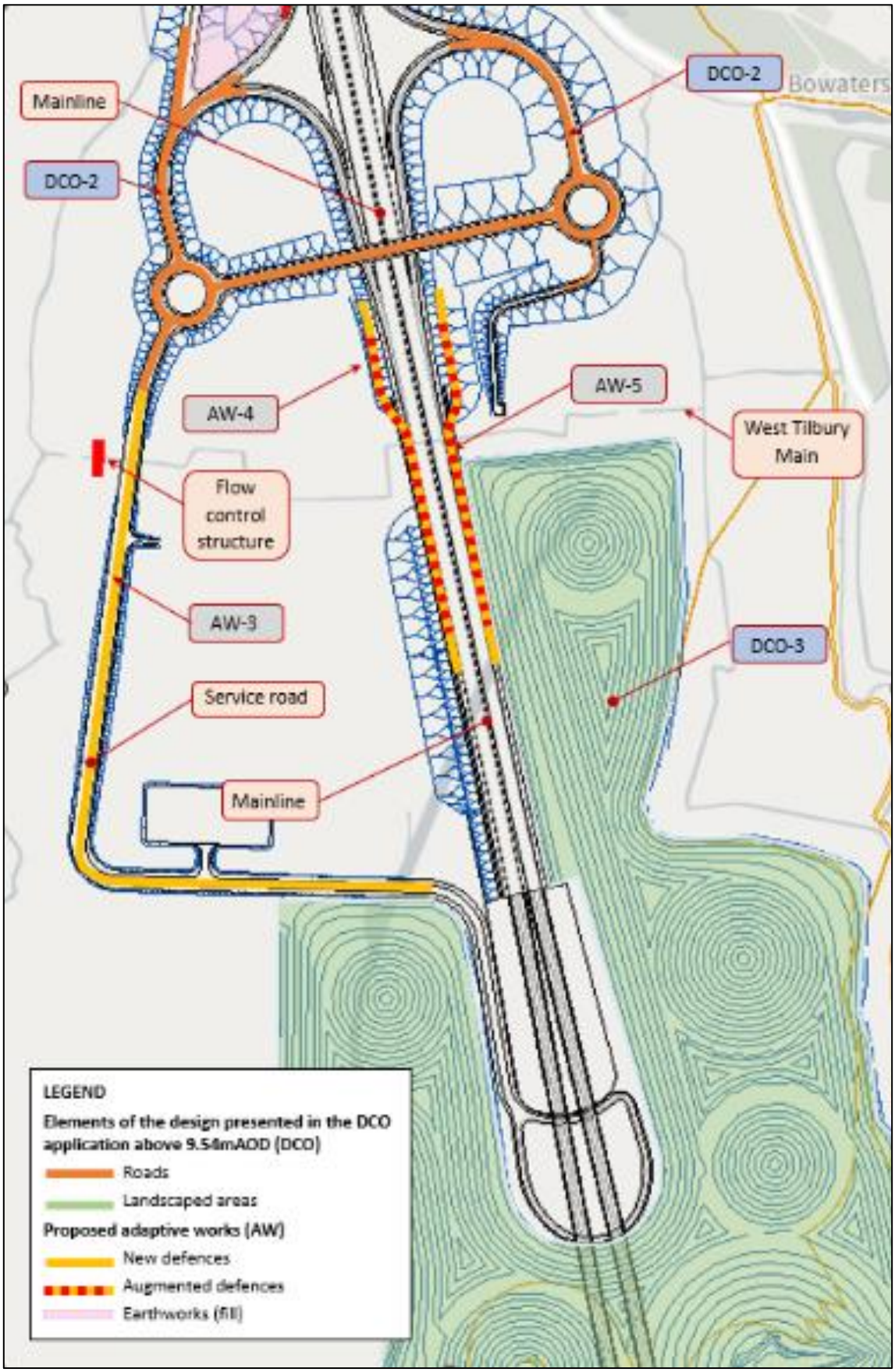
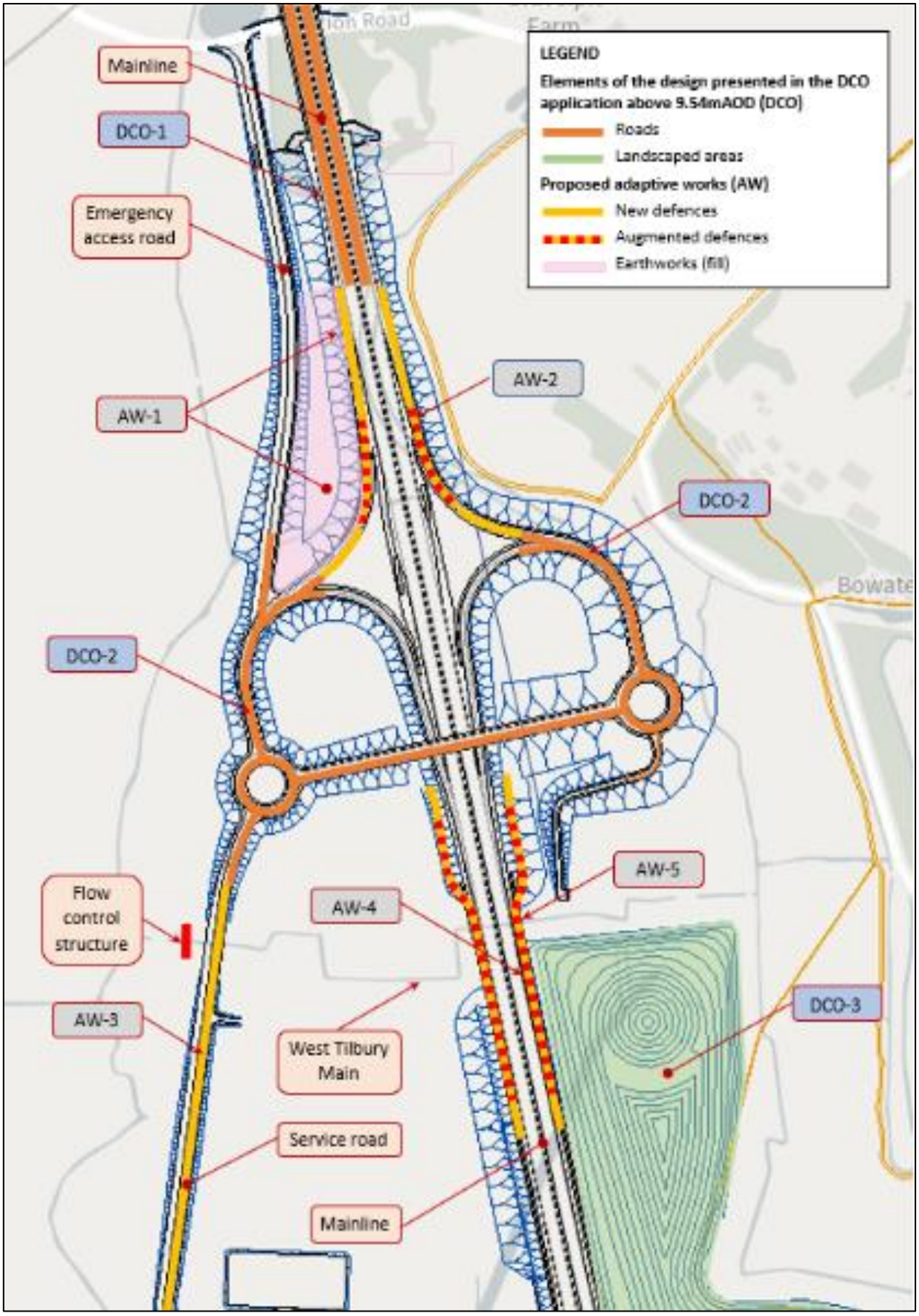


Plate 4.2 Adaptive works – Sheet 2 of 2



4.1.4 Typical examples of how the adaptive works could be applied to an embankment are shown in Plate 4.3, Plate 4.4 and Plate 4.5.

Plate 4.3 Adaptive works – raised embankment

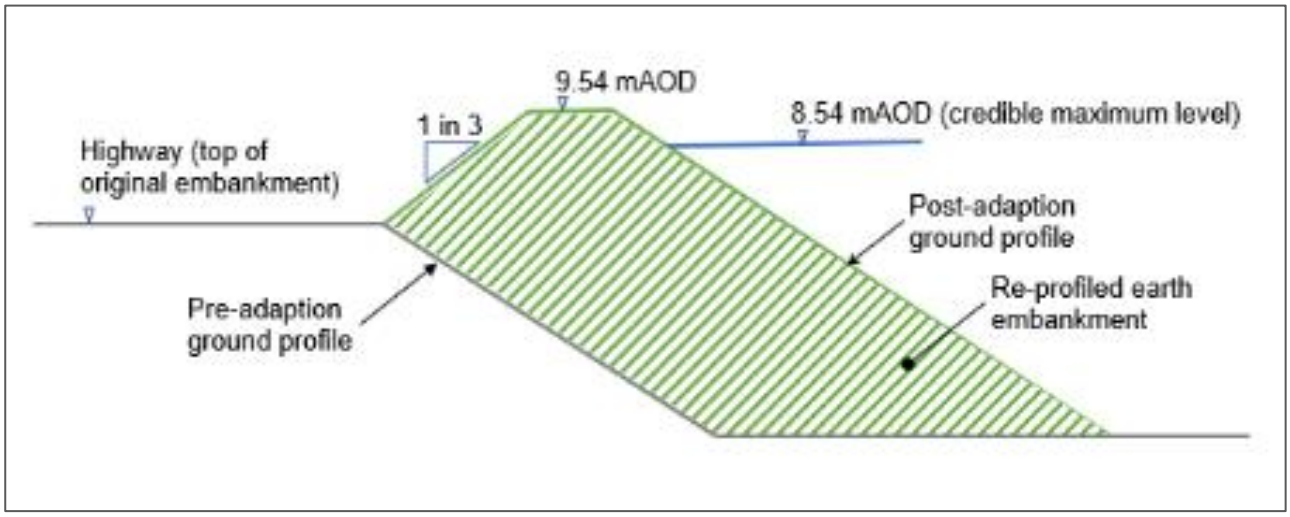


Plate 4.4 Adaptive works – increasing the height of a retaining wall

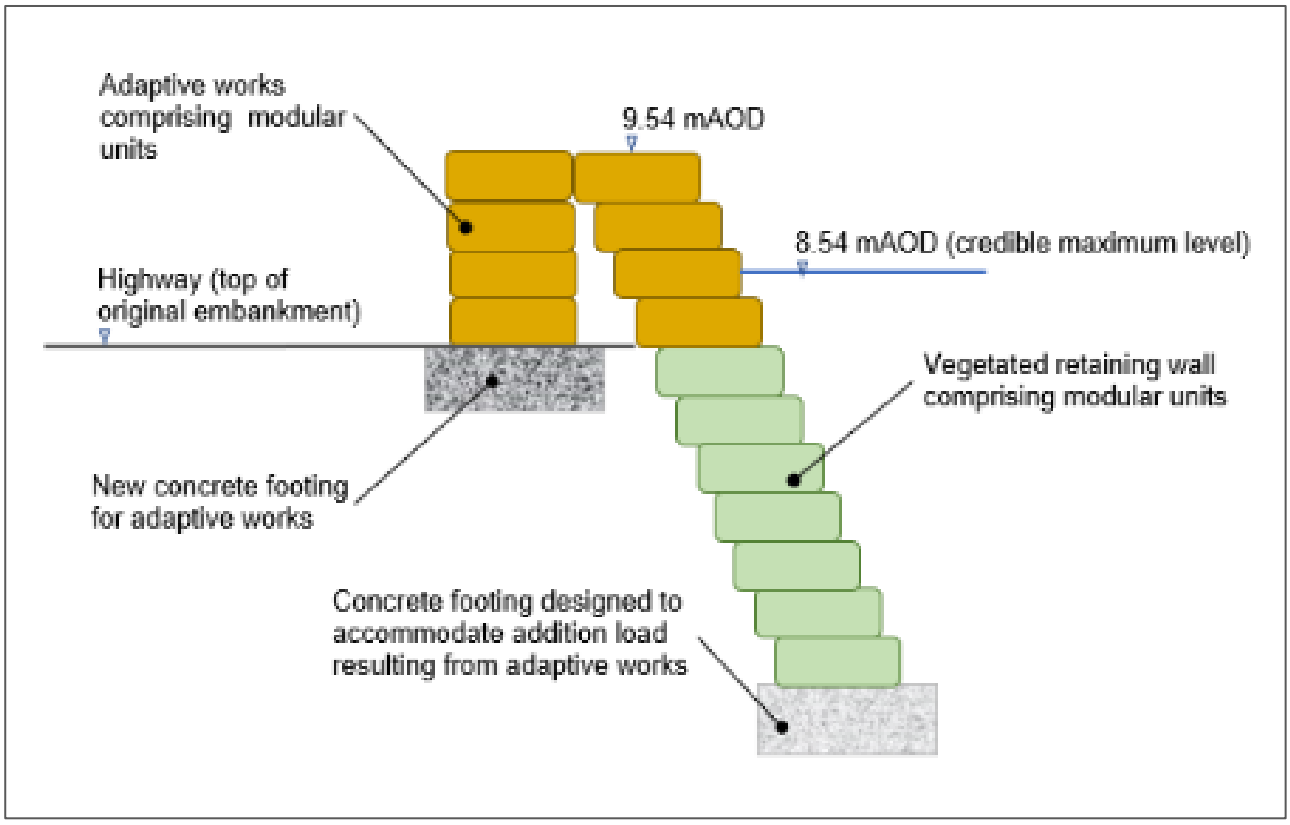
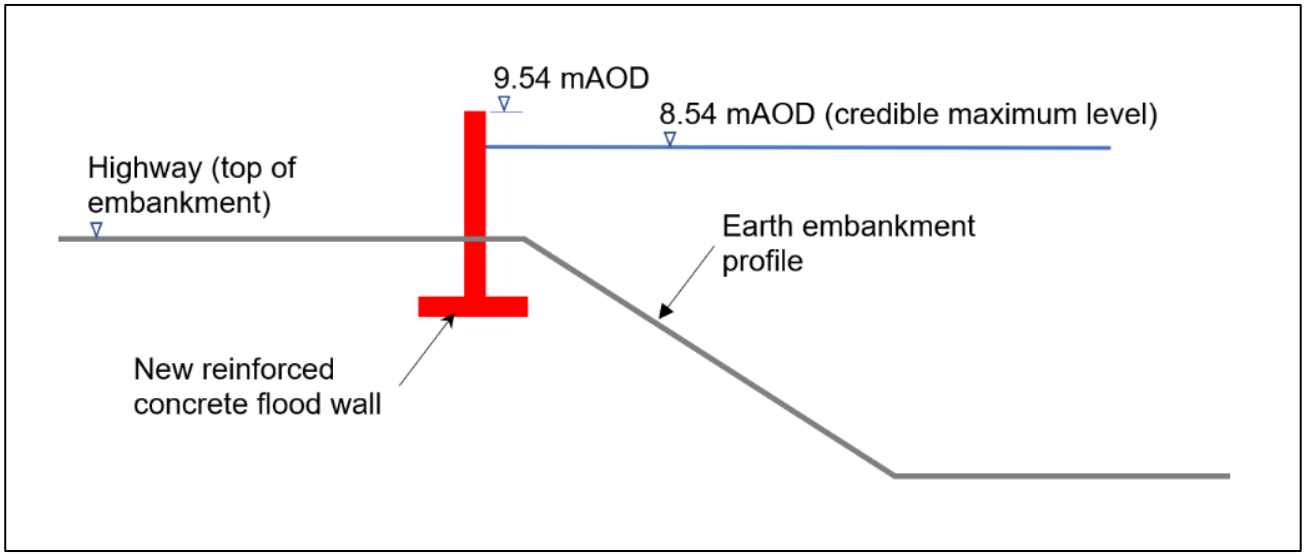


Plate 4.5 Adaptive works – constructing a reinforced concrete flood wall



4.1.5 It is likely to be several decades before any adaptive works become necessary, if at all. Given this timeframe, options for adaptive works may benefit from new construction techniques and innovations.

5 Summary

5.1 National guidance

Credible maximum scenario

5.1.1 The design presented in the DCO application complies with the current version of the NPSNN.

5.1.2 A draft update of the NPSNN is currently under consultation. This draft includes provisions for assessing credible maximum climate change scenarios and adaption.

5.1.3 The implications that the updated version of the NPSNN would have on the FRA have been assessed and presented in this Technical Note.

Design horizon

5.1.4 The latest planning practice guidance for the National Planning Policy Framework (NPPF) states that where development has an anticipated lifetime significantly beyond 100 years, such as some major infrastructure projects, it may be appropriate to consider a longer period for the lifetime of development when assessing the potential impacts of climate change on flood risk. For the purposes of this Technical Note, a development lifetime of 120 years has been adopted. This period is based on the design working life of structures as stated in BS EN 1990.

Adaptive approach

5.1.5 The Environment Agency's climate change guidance notes that some measures to manage flood risk are not necessary now but may be in the future.

5.1.6 The adaptive approach considers the ease with which existing flood defences can be enhanced in the future to protect against large-scale climate change.

5.2 Design flood level for adaptive works

5.2.1 The flood level assessed for adaptive works for 2152 is 8.54mAOD. This is based on the credible maximum sea level for 2152 (H++ with surge) and takes account of the following:

a. The requirements of the proposed update to the NPSNN

b. An extended design horizon of 120 years in accordance with planning practice guidance for the NPPF

c. Revised EWLs for the Thames Estuary provided by the Environment Agency (May 2023)

d. Worst case location option for the future Thames barrier (Long Reach) (TE2100 Plan)

e. The ministerial statement pushing Project construction completion date and lifetime of the Project back by two years

5.2.2 The crest level of the adaptive works would be 9.54mAOD. This includes a 1.0m residual uncertainties allowance (freeboard) on the assessed flood level.

5.3 Adaptive design

5.3.1 To be resilient to large-scale climate change, the crest level of the defences may need to be raised by up to 9.54mAOD. Notwithstanding this requirement, some elements of the Project already exceed this level so the location of adaptive works will be selective.

5.3.2 To provide full protection against the credible maximum flood level, the following adaptive measures could be necessary:

a. Raising the level of embankments

b. Raising the crest level of earth retaining walls

c. Erecting flood walls

d. Constructing flood protection bunds

5.3.3 If adaptation were required, the selected approach would be informed by a detailed geotechnical assessment, client preferences and future road operator's asset management procedures. Subject to the design selected by the Delivery Partner, all of these adaptive measures could comprise earthworks only. Hard engineered solutions could be used to deliver some of the measures but an earthworks solution would likely be easier to deliver and less costly, and undertaken with minimal disruption to flow of traffic along the Project road.

5.4 Limits of deviation

5.4.1 The limits of deviation are designed to ensure that the development consent, if granted, includes a proportionate amount of flexibility, allowing a degree of 'deviation' from certain aspects of the design presented for the DCO application. They are necessary because development consent is being applied for before the detailed design stage of the Project has commenced.

5.4.2 For highway works, the limits of deviation for vertical deviation of the highway linear works are subject to a maximum deviation of 0.5 metres upwards or 1m downwards [**REP4-002**].

5.4.3 The limits of deviation are not intended to provide for potential future adaptive works, if required.

5.5 Timescale

5.5.1 Adaptive works would be considered several decades after the Project becomes operational.

References

British Standards Institution (2004). BS EN 1990 – UK National Annex for Eurocode. Basis of structural design

Department for Levelling Up, Housing and Communities (2022). Guidance – Flood risk and coastal change. Accessed May 2023. https://www.gov.uk/guidance/flood-risk-and-coastal-change

Department for Transport (2014). National Policy Statement for National Networks. https://www.gov.uk/government/publications/national-policy-statement-for-national-networks

Department for Transport (2023). Draft National Policy Statement for National Networks. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1141537/draft-nps-for-national-networks-web.pdf

Environment Agency (2016). Adapting to climate change: guidance for risk management authorities. https://www.gov.uk/government/publications/adapting-to-climate-change-for-risk-management-authorities

Environment Agency (2022). Guidance – Flood risk assessments: climate change allowances. Accessed May 2023. https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Secretary of State for Transport (2023). Transport Update. Statement UIN HCWS625. https://questions-statements.parliament.uk/written-statements/detail/2023-03-09/hcws625

Annex

Annex A Adaptive design options

A.1 Vegetated green wall

A.1.1 Using mechanically stabilised earth principles alongside geotextile technology allows for strong and easy-to-install geo modular block structures.

A.1.2 Non-woven geotextile bags filled with a mixture of sand and compost can be formed into near-vertical (85°) retaining walls, culvert headwalls, acoustic barriers, green landscaping structures and erosion resistant river/coastal banks.

A.1.3 Typical examples of vegetated green walls are shown in Plate A.1.

Plate A.1 Typical vegetated wall systems[6]

[6] Images courtesy of Gravitas International https://www.gravitasint.com/?gclid=Cj0KCQjwsIejBhDOARIsANYqkD00uVdA2FbIvjq-bCAuMQM8o28ellEMWRX62ksfQDelLudyHb0jPMIaAmH6EALw_wcB

A.2 Precast concrete walls

A.2.1 An example of a precast concrete flood wall is presented in Plate A.2.

Plate A.2 Precast concrete flood wall[7]

7 Avonmouth Docks flood defence works, image courtesy of New Civil Engineer.

Annex C.19 Environment Agency Acceptance of LTC's Adaptive Design Technical Note

creating a better place for
people and wildlife

Environment Agency

[redacted]

Our ref: KT/2023/131132/02-L01
Your ref: Lower Thames Crossing

Date: 08 December 2023

Dear [redacted]

Lower Thames Crossing Adaptability Technical Note

Thank you for consulting us on the Adaptability Technical Note.

We are satisfied that our outstanding comments have been absorbed and incorporated into the latest Adaptability Technical Note.

Please do not hesitate to contact us should you require any further information.

Yours sincerely

[redacted]

If you need help accessing this or any other National Highways information, please call **0300 123 5000** and we will help you.

If you have any enquiries about this publication email **info@nationalhighways.co.uk**
or call **0300 123 5000***.

*Calls to 03 numbers cost no more than a national rate call to an 01 or 02 number and must count towards any inclusive minutes in the same way as 01 and 02 calls.

These rules apply to calls from any type of line including mobile, BT, other fixed line or payphone. Calls may be recorded or monitored.

Printed on paper from well-managed forests and other controlled sources when issued directly by National Highways.

Registered office Bridge House, 1 Walnut Tree Close, Guildford GU1 4LZ

National Highways Company Limited registered in England and Wales number 09346363