ENVIRONMENTAL STATEMENT: 6.1 CHAPTER 11: WATER ENVIRONMENT AND FLOOD RISK

DECARBONISATION

Cory Decarbonisation Project

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11. WATER ENVIRONMENT AND FLOOD RISK

11.1. INTRODUCTION

11.1.1. This chapter reports the assessment of the likely significant effects of the Proposed Scheme on the water environment and flood risk during construction and operation and describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operation phase.

11.1.2. A number of technical appendices have been produced to accompany this chapter including:

- **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**;
- **Appendix 11-2: Flood Risk Assessment (Volume 3)**;
- **Appendix 11-3: Groundwater Impact Assessment (Volume 3)**; and
- **Appendix 11-4: Coastal Modelling Studies (Volume 3)**.

11.1.3. This chapter (and its associated figures and appendices) is intended to be read as part of the wider ES, with particular reference to **Chapter 7: Terrestrial Biodiversity (Volume 1)**, **Chapter 8: Marine Biodiversity (Volume 1)**, **Chapter 16: Material and Waste (Volume 1)** and **Chapter 17: Ground conditions and Soils (Volume 1)**.

11.1.4. An **Outline Drainage Strategy (Document Reference 7.2)** has also been produced to support the application. This presents the approach to both surface water and foul water drainage.

11.2. POLICY, LEGISLATION, AND GUIDANCE

11.2.1. The policy, legislation, and guidance relevant to the assessment of the water environment and flood risk for the Proposed Scheme is detailed in **Table 11-1**.

Table 11-1: Water Environment and Flood Risk Summary of Key Policy, Legislation, and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2024[1]	This Overarching National Policy Statement for Energy (EN-1) is part of a suite of NPS designated by the Secretary of State of DESNZ in January 2024.

Policy, Legislation or Guidance	Description
	NPS EN-1 (paragraphs 5.16.1 and 5.16.2) recognises that infrastructure development can have adverse effects on the water environment. It states that the "*effects could lead to adverse impacts on health or on protected species and habitats and could result in surface waters, groundwaters or protected areas failing to meet environmental objectives established under the Water Framework Directive (WFD)"*. Paragraph 5.16.3 states that where developments are "*likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of, the proposed project on water quality, water resources and physical characteristics of the water environment, and how this might change due to the impact of climate change on rainfall patterns and consequently water availability across the water environment as part of the ES*". This Environmental Statement (ES) should particularly describe the existing quality of watercourses, existing water resources, existing physical characteristics of the water environment, impacts on protected water bodies and areas and how climate change could impact any of the previous elements in the future (paragraph 5.16.7). Section 5.8: Flood Risk sets out that developments of 1 hectare or greater in Flood Zone 1 in England and all developments for energy projects located in Flood Zones 2 and 3 in England should be accompanied by a Flood Risk Assessment (FRA) (see paragraph 5.8.13). In determining an application for development consent, the SoS should be satisfied that, where relevant (Paragraph 5.8.36):

Policy, Legislation or Guidance	Description
	• *"The application is supported by an appropriate FRA;* • *The Sequential Test has been applied and satisfied as part of site selection;* • *A sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk;* • *The proposal is in line with any relevant national and local flood risk management strategy;* • *Sustainable Drainage Systems (SuDS) have been used unless there is clear evidence that their use would be inappropriate;* • *In flood risk areas the project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere;* • *The project includes safe access and escape routes where required, as part of an agreed emergency plan, and that any residual risk can be safely managed over the lifetime of the development; and* • *Land that is likely to be needed for present or future flood risk management infrastructure has been appropriately safeguarded from development to the extent that development would not prevent or hinder its construction, operation or maintenance".* Section 5.16: Water Quality and Resources (Paragraph 5.16.7) details that This Environmental Statement (ES) should in particular describe: • *The existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges;*

Policy, Legislation or Guidance	Description
	• *Existing water resources affected by the proposed project and the impacts of the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Abstraction Licensing Strategies) and also demonstrate how proposals minimise the use of water resources and water consumption in the first instance;* • *Existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics;* • *Any impacts of the proposed project on water bodies or protected areas (including shellfish protected areas) under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and source protection zones (SPZs) around potable groundwater abstractions;* • *How climate change could impact any of the above in the future; and* • *Any cumulative effects".*
National Planning Policy Framework (NPPF) 2023[2]	The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to the water environment. Section 14 of the NPPF (Paragraphs 165-175) details the requirements for a FRA. **Appendix 11-2: Flood Risk Assessment (Volume 3)** has been prepared for the Proposed Scheme. In accordance with the NPPF, the FRA assesses the potential impacts of flooding on, and because of, the Proposed Scheme and ensures that the Proposed Scheme is sequentially

Policy, Legislation or Guidance	Description
	appropriate, and how the Sequential Test and Exception Test have been applied.
The London Plan 2021[3]	The Spatial Development Strategy for Greater London setting out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policies SI12 to SI14 detail how the Proposed Scheme will need to take into consideration the local flood risk within and surrounding the Site and use sustainable drainage systems and highlight the importance and strategic role of the River Thames.
The Bexley Local Plan 2023[4]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough, including measures to address water supply and quality, flood risk and effects of climate change, amongst others. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. The Local Plan details the flood risk management considerations for developments in: • Policy DP18: Waterfront development and development including, or close to flood defences – requiring development to protect and enhance the water space; • Policy DP19: The River Thames and the Thames Policy Area - sets out the development management considerations that relate to the nature conservation and quality of the River Thames; • Policy DP29: Water quality, supply and treatment – addressing quality of the water environment, impacts on the water supply and wastewater/sewage infrastructure and impacts on sensitive development from Crossness Sewage Treatment Works;

Policy, Legislation or Guidance	Description
	• Policy DP32: Flood risk management – establishing the approach to managing flood risk through new and re-development opportunities in the area; • Policy DP33: Sustainable drainage systems – outlining the approach to managing sustainable drainage systems through development proposals; and • SP13: Protecting and enhancing water supply and wastewater infrastructure.
London Environment Strategy 2018[5]	The London Environment Strategy seeks to ensure that London will become a "*zero carbon city by 2050*" by setting out policies and proposals in seven policy areas to address environmental challenges, including the transition to a low carbon circular economy. The London Environment Strategy contains the aim to ensure that relate to the water environment: "Reduce risks and impacts of flooding in London on people and property and improve water quality in London's rivers and waterways".
Bexley Level 1 Strategic Flood Risk Assessment 2019[6]	The purpose of the Bexley Level 1 Strategic Flood Risk Assessment (SFRA) was to collate and analyse the most up to date readily available flood risk information for all sources of flooding and provide an overview of the flood risk issues across Bexley. The Level 1 SFRA identifies several designated main rivers within the Site under the jurisdiction of the Environment Agency and that the Site is protected by flood defences located along the River Thames.
Bexley Level 2 Strategic Flood Risk Assessment 2020[7]	The Bexley Level 2SFRA provides evidence to support exception tests. The purpose of the Level 2 SFRA is to ensure that proposed developments which need to be located in areas at risk of flooding, are supported by an

Policy, Legislation or Guidance	Description
	exception test showing how flood risk will be managed.
Bexley Local Flood Risk Management Strategy 2017[8]	The Local Flood Risk Management Strategy sets of the processes and procedures for managing surface water, groundwater and ordinary watercourse flooding in the Borough.
Charlton to Bexley Riverside Integrated Water Management Strategy 2017[9]	The Charlton to Bexley Riverside Integrated Water Management Strategy sets out the framework to support proposed development whilst avoiding sewer and surface water flooding and increasing water supply security in a sustainable manner. The Strategy also includes Thames Water's plan for addressing the forecast deficit in the London Water Resource Zone through a combination of measures to tackle leakage, manage and reduce water demand, and install new water supply schemes.
South East Inshore Marine Plan 2021[10]	The South East Inshore Marine Plan area stretches from Felixstowe in Suffolk to west of Dover in Kent and incorporates the River Thames. The South East Inshore Marine Plan will help to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. Policy SE-CC-2 states that "proposals in the South East Marine Plan area should demonstrate for the lifetime of the project that they are resilient to the impacts of climate change and coastal change". In addition, Policy SE-CC-1 advises that proposals must demonstrate that they will avoid, minimise or mitigate any significant adverse impacts on existing activities.

Policy, Legislation or Guidance	Description
The Thames River Basin District River Basin Management Plan 2022[11]	The Thames River Basin District (RBD) River Basin Management Plan describes the challenges that threaten the water environment and how these challenges can be managed.
Legislation	
Flood and Water Management Act 2010[12]	The Flood and Water Management Act created the role of the Lead Local Flood Authority (LLFA) to take responsibility for leading the co-ordination of local flood risk management in their areas. In accordance with the Act: • the Environment Agency is responsible for the management of risks associated with main rivers (such as the River Thames), the sea and reservoirs; and • the LLFA is responsible for the management of risks associated with local sources of flooding such as ordinary watercourses, surface water and groundwater. LBB is the LLFA for the Site. Schedule 3 of the Act is due to be implemented later in 2024. Consequential to the wording of the **Draft DCO (Document Reference 3.1)** which applies the exception given to Nationally Significant Infrastructure Projects (NSIPs), the Proposed Scheme does not need to meet the requirements of Schedule 3 of the Flood and Water Management Act. However, the LLFA has been consulted throughout the preparation of the **Outline Drainage Strategy (Document Reference 7.2)**, as similar principles have been applied to the Proposed Scheme.
The Environmental Permitting (England and Wales) 2016 as amended by the Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations 2018[13]	Under the Environmental Permitting Regulations, it is an offence to cause or knowingly permit a water discharge activity, including the discharge of polluting materials to freshwater, coastal waters, relevant territorial waters or groundwater, unless complying with

Policy, Legislation or Guidance	Description
	an exemption or an Environmental Permit (obtained from the Environment Agency). The Environment Agency sets conditions which may control volumes and concentrations of particular substances or impose broader controls on the nature of the effluent, taking into account any relevant water quality standards from EU directives. The Environmental Permitting Regulations also manage works that have the potential to affect a watercourse under the jurisdiction of the Environment Agency. Any works in, under or near a main river require permission from the Environment Agency to ensure no detrimental impacts on the watercourse. There are several designated main rivers located within the Site. In the case of the Proposed Scheme, the relevant provisions of the Regulations have been disapplied and consent will be granted under Protective Provisions for the Environment Agency's benefit.
Land Drainage Act 1991[14]	LLFA and Internal Drainage Boards (IDB) have additional duties and powers associated with the management of flood risk under the Land Drainage Act. Consent must be given for any permanent or temporary works that could affect the flow within an ordinary watercourse under their jurisdiction to ensure that local flood risk is not increased. The Land Drainage Act also sets out the maintenance responsibilities of riparian owners to reduce local flood risk. The **Draft DCO (Document Reference 3.1)** has disapplied this provision with protections for the LLFA set out in the relevant DCO articles, requirements and the **Outline CoCP (Document Reference 7.4)**.
The Water Environment (Water Framework Directive) (England and Wales) Regulations (the	The WFD (2000/60/EC) establishes a framework for the management and protection of Europe's water resources. It was

Policy, Legislation or Guidance	Description
'Water Framework Regulations') (2017)[15]	implemented in England and Wales through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended). The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (as amended) has subsequently been revoked and replaced by the Water Framework Regulations. The Water Framework Regulations aim to prevent deterioration of the water environment and improve water quality by managing water in natural river basin districts and through the protection of groundwater against pollution. The Regulations impose duties on the Secretary of State and the Environment Agency to ensure compliance with the EU Directive 2000/60/EC, in particular when deciding whether to grant, vary or revoke certain permits and licences which affect water quality. **Appendix 11-1: Water Framework Directive Assessment (Volume 3)** provides the WFD Assessment for the Proposed Scheme. Part 2 of the Regulations requires the identification of river basin districts and assessments to be carried out by the Environment Agency to characterise and classify the status of water bodies in those districts and assess the economic aspects of water use. River Basin Management Plans must be established for each river basin district. Part 3 of the Regulations makes provision for certain protected areas, includes requires the identification of bodies of water from which drinking water is abstracted, and specific measures are specified that must be included in a programme of measures to protect the quality of the water.

Policy, Legislation or Guidance	Description
The Water Resources Act 1991[16]	The Water Resources Act aims to regulate water resources, water quality and pollution and flood defences within the UK to minimise pollution of water. Part II of the Act deals with the management of water resources. This includes the licences required to abstract and impound controlled water. These licences are regulated by the Environment Agency. Part III of the Act addressed the control of water pollution, including the discharge consent system and water pollution offences, regulated by the Environment Agency. However, the Environmental Permitting Regulations currently define the regime on water discharge permits. Part IV deals with flood defences and Part VII deals with anti-pollution works and works notices. A works notice can be served on anyone that causes or knowingly permits a pollutant to enter controlled waters.
The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (as amended)[17]	The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 apply in England and in specified marine waters and the seabed. They specify the types of damage to a protected species or natural habitat, a site of special scientific interest, water or land which constitute "*environmental damage*" for the purposes of the regulations and the types of activity causing environmental damage to which the regulations apply. There are certain exemptions and exclusions from the application of the regulations. The Regulations also specify the authorities whose function it is to enforce the regulations. Environmental damage to groundwater means any damage to a body of groundwater such that its conductivity, level or concentration of pollutants changes sufficiently to lower its status for the purposes of Directive 2000/60/EC and in

Policy, Legislation or Guidance	Description
	relation to pollutants, for the purposes of Directive 2006/118/EC of the European Parliament and of the Council on the protection of groundwater against pollution and deterioration, whether or not the body of groundwater is in fact reclassified as being of lower status.
The Water Industry Act 1991[18]	The Water Industry Act sets out the main powers and duties of the water and sewerage companies. This replaces those set out in the Water Act 1989 and defines the powers of the Director General of Water Services (now known as the Water Services Regulation Authority (Ofwat)).
The Water Act 2003[19]	The Water Act is an update to the Water Resources Act 1991 and the Water Industry Act 1991 and aims to provide a modern, efficient and robust legislative framework to facilitate both sustainable water resources management and economic growth through the new provisions it contains. It is relevant to the Proposed Scheme due to its legislative power in ensuring the protection of controlled waters within the Site, water conservation and flood defences.
The Water Act 2014[20]	The Water Act 2014 is an update to the Water Resources Act 1991, the Water Industry Act 1991 and the Water Act 2003, which enables greater competition for non-household customers and gives Ofwat new powers to make rules about charges and charging schemes, as well as making provisions for flood insurance and drainage boards. It is relevant for the Proposed Scheme due to its legislative power in ensuring the protection of controlled waters within the Site and in relation to licences to abstract water and specifically the purchase of potable water.

Policy, Legislation or Guidance	Description
The Groundwater (Water Framework Directive) (England) Direction 2016[21]	The Groundwater Direction instructs the Environment Agency on obligations to protect groundwater (water found below the surface), updating requirements including: • the monitoring and setting of thresholds for pollutants in groundwater; • adding new pollutants to the list of pollutants to be monitored; and • changing the information to be reported to the European Commission. The Groundwater (Water Framework Directive) (England) Direction 2016 revokes and replaces the Groundwater (Water Framework Directive) (England) Direction 2014.
Environment Act 2021[22]	The Environment Act makes provision about targets, plans and policies for improving the natural environment. Part 5 of the Act focuses on protection of the water environment and contains several important subsections on this topic relevant to developers.
Metropolis Management (Thames River Prevention of Floods) Amendment Act 1879[23]	The Metropolis Management (Thames River Prevention of Floods) Amendment Act 1879 requires riparian owners along the River Thames to carry out flood works to maintain the flood defences that they own.
Climate Change Act 2008[24]	The Climate Change Act 2008 sets out the basis for the UK Government's approach to tackling and responding to climate change. It requires that emissions of carbon dioxide and other greenhouse gases are reduced and that climate change risks are adapted to. The Act also establishes the framework to deliver on these requirements. Amongst other measures the Climate Change Act requires the UK Government to undertake a five year assessment of the risks of climate change on

Policy, Legislation or Guidance	Description
	the UK, the current version is 'UK Climate Change Risk Assessment 2022[25]".
Guidance	
National Planning Practice Guidance (NPPG) (2021)[26]	Guidance relevant to the planning system in England. Relevant to this assessment, the NPPG advises how to take account of and address the risks associated with flooding and coastal change in the planning process.
Guidance for Pollution Prevention (GPP)[27]	The GPP have been developed and published to provide environmental good practice guidance for the whole of the UK.
Pollution Prevention for Businesses Guidance[28]	The Pollution Prevention for Business Guidance (PPBG) supplements the GPP by providing environmental regulatory guidance for businesses in England, especially, in how to avoid causing pollution from oil and chemical storage.

11.3. CONSULTATION AND ENGAGEMENT

11.3.1. **Table 11-2** provides a summary of the consultation and engagement undertaken in support of the preparation of this assessment.

11.3.2. **Table 11-3** provides a summary of comments provided as part of the statutory consultation process and an appropriate response.

11.3.3. **Appendix 4-2: Scoping Opinion Responses (Volume 3)** provides a summary of the Planning Inspectorate and consultee comments on the EIA Scoping Opinion[29] and the Applicant's responses.

Table 11-2: Consultation and Engagement Summary Table in relation to the Water Environment and Flood Risk

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
15th March 2023, Meeting	Port of London Authority	Discussion with the Port of London Authority (PLA) identified a disused outfall structure located approximately 455m to the southwest of the Site Boundary. The disused outfall is associated with the former Belvedere Power Station.
13th April 2023, Meeting	Environment Agency	The Environment Agency advised that it holds the Marsh Dykes Hydraulic Model, which is the best representation of flood risk in the area, and that this can be provided. The Environment Agency also advised that it is in the process of updating the Thames Estuary 2100 extreme water levels within the River Thames, and will subsequently update the associated breach modelling, although both elements may not be available prior to submission of the application for development consent. The proposed methodology for the coastal modelling and sediment processes assessment was presented by the Applicant. It was agreed further consultation on the methodology for the Flood Risk Assessment (**Appendix 11-2: Flood Risk Assessment (Volume 3)**), the coastal modelling and sediment processes assessment would be undertaken.
Ongoing since April 2023, Emails	Environment Agency	Local flood model data requests were made via email following the meeting on the 13th April 2023 for the Marsh Dykes hydraulic model and the Thames Estuary Breach Assessment (2018). These were provided by the Environment Agency. An updated coastal modelling and sediment processes assessment methodology was provided on 7th June 2023 for discussion and agreement.

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
Ongoing since June 2023, Emails	London Borough of Bexley (LBB) (in their role as LLFA)	The Applicant requested data and engagement on design principles for the **Outline Drainage Strategy (Document Reference 7.2)** which was agreed will be prepared as part of the DCO application.
7th August 2013, Email	Thames Water	A Commercial Drainage and Water Enquiry was sent to Thames Water to determine existing piping infrastructure in the area. A property search was completed by Thames Water.
15th August – 17th September, Emails	Thames Water	A pre-planning enquiry application form was submitted the Thames Water. The enquiry was for both clean water and wastewater. During the stated period further information was sent to allow for the capacity of the network to be assessed. The assessment concluded there was insufficient capacity in the network, and the Applicant has therefore developed the Proposed Scheme processes to reduce its cooling water requirements and the need for Thames Water capacity.
15th September 2023, Meeting	Environment Agency	Following emails requesting the Marsh Dykes Model and Thames Estuary 2100 water levels, a meeting was held with the area relevant planning specialists to confirm what data requests were outstanding and to whom the requests for data had been sent. Follow up actions were assigned to both parties.
20th September 2023, Meeting	Environment Agency	Meeting to discuss the data available and the methodology for the Flood Risk Assessment (**Appendix 11-2: Flood Risk Assessment (Volume 3)**), and the methodology for the coastal modelling and sediment processes assessment.

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
		In terms of the sediment assessment the Environment Agency confirmed that they have no concerns regarding sedimentation of the Great Breach Outfall, vessel wash, intertidal habitats, and impacts on the River Thames flood defences. The Environment Agency also confirmed that sediment modelling would be required. It was confirmed that the existing 2018 Thames Estuary Breach Assessment is the best available data for use within and informing the breach assessment aspect of the Flood Risk Assessment (**Appendix 11-2: Flood Risk Assessment (Volume 3)**). The Environment Agency's key concern in relation to flood risk is regarding people and keeping people safe. These have been considered and taken into account during ongoing consultation, engagement and design evolution.
28th September 2023, Email	Thames Water	Thames Water supplied the Applicant with a clean water capacity report stating their clean water network could only partially supply the indicative water demand requirements of the Proposed Scheme. There is sufficient capacity to supply the office space as part of the Proposed Scheme.
28th September 2023, Meeting	London Borough of Bexley (in their role as LLFA)	Meeting to discuss the **Outline Drainage Strategy (Document Reference 7.2)** with the LLFA and the ditch removal as part of the Proposed Scheme. The LLFA requested information on the characteristics of the ditches to support the DCO application. This assessment is to assess the physical flow constraints and conditions of the watercourses. This is detailed in **Section 11.6**. The LLFA confirmed which climate change allowances should be included within the **Outline Drainage Strategy (Document Reference 7.2)**.

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
6th October 2023, Meeting	Thames Water	Discussion between the Applicant and Thames Water regarding the clean water capacity report. It was recommended by Thames Water that the Applicant investigate reducing the potable water demands of the Proposed Scheme.
10th October 2023, Email	Thames Water	Thames Water confirmed that a trade effluent consent form would need to be submitted for the Site to assess the possibility of connecting to the existing Thame Water wastewater network.
23rd November 2023, Meeting	Thames Water	Discussion between the Applicant and Thames Water regarding the approach taken in scheme development to date relating to the potable water demand for the Proposed Scheme. The Applicant updated Thames water and explained how the cooling demand has been reduced through increasing the cycle rates of the cooling towers for the Proposed Scheme. Thames Water provided feedback during the meeting that they would still be unlikely able to supply the requested volume, even though it had reduced from the previous estimate.
1st December 2023, Meeting	Environment Agency	Meeting to discuss the WFD Screening and Scoping Report with the technical specialists at the Environment Agency. The main elements proposed to be scoped in and out of the WFD impact assessment (presented as **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**) were discussed. An additional meeting was determined to be needed to allow sufficient time for the technical specialists at the Environment Agency to review the submitted report.

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
13th December 2023, Meeting	Environment Agency	Meeting to further discuss the WFD Screening and Scoping Report with the technical specialists at the Environment Agency following their review of the report. The Environment Agency provided initial comments regarding water quality in the River Thames and the assessment undertaken, with formal comments to be provided in due course.
14th December 2023, Meeting	Environment Agency	Meeting to discuss the hydraulic and sediment modelling undertaken to support this assessment. The preliminary results of the assessments were presented to the Environment Agency. The results of the hydraulic modelling undertaken are presented in **Appendix 11-2: Flood Risk Assessment (Volume 3)** and the results of the sediment modelling undertaken are presented in **Appendix 11-4: Coastal Modelling Studies (Volume 3)**.
20th December 2023, Email	Environment Agency	Email providing baseline water quality data and additional guidance on the assessment of water quality within the River Thames regarding construction and operational dredging to inform the WFD impact assessment (presented as **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**).
22nd December 2023, Email	Environment Agency	Email providing technical feedback on the WFD Screening and Scoping report submitted for comment from the technical specialists at the Environment Agency (now superseded by **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**.

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
30th January 2024, Meeting	Thames Water	Meeting between the Applicant and Thames Water to discuss further measures incorporated into the design of the Proposed Scheme to reduce its water demand, including: • reducing cooling demand by switching to dry cooling for the CO_2 Processing Plant; • pre-cooling the incoming flue gas (for re-heating outlet flue gas and/or use in the Heat Recovery and Heat Transfer System); • rainwater harvesting; and • onsite storage to help balance water supply demand at peak times. Thames Water agreed to carry out network modelling on the new flow requirement provided.
7th February 2024, Meeting	Marine Management Organisation (MMO)	Meeting to present the Proposed Jetty proposals, associated dredging requirements, analysis undertaken to assess the coastal processes and risks to water quality in the River Thames, and further data requested by the MMO in order to validate the findings of this chapter and **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**.
27th February 2024, Meeting	Thames Water	Meeting between the Applicant and Thames Water to discuss further the likely water requirements of the Proposed Scheme. Thames Water explained that they are looking at the indicative water demand in a strategic context.

Table 11-3: Summary of the Statutory Consultation Comments in relation to Water Environment and Flood Risk

Comment	Response
London Borough of Bexley (LLFA)	
"The Lead Local Flood Authority has no specific comments to make but will be interested to review the FRA and to see in which ways it is felt that risk from surface water is not accurately represented by the Environment Agency mapping."	**Appendix 11-2: Flood Risk Assessment (Volume 3)** details the assessment of the Proposed Scheme.
Environment Agency	
"We will support plans which deliver environmental and flood risk improvements and are supported with detailed surveys to decide required mitigation and compensation measures."	Consultation with the Environment Agency has been undertaken to support this chapter and associated appendices. Consultation has comprised discussion regarding assessment methodologies and assessment results and mitigation measures which have been incorporated into the Proposed Scheme design (embedded mitigation). The embedded mitigation of relevance to this chapter is presented in **Section 11.7**).
"We would support design which minimises the built footprint thereby reducing the need for land raising and removal or overshadowing of watercourses."	The design of the Proposed Scheme has been undertaken in such a manner to reduce the built footprint, as detailed in **Chapter 3: Consideration of Alternatives (Volume 1)**. The potential effects of overshadowing of watercourses are addressed in **Chapter 7: Terrestrial Biodiversity (Volume 1)**.
"Some increase in residual breach flood risk is expected, caused by the reduction in the area and volume of the floodplain during a	Baseline and post development breach modelling has been undertaken to understand the implications on residual flood risk to

Comment	Response
breach in the Thames tidal flood defences. Furthermore, more information should be provided to assess the potential for the ground level raising to increase surface water and fluvial flood risk due to the area of ground raising just south of Riverside 1."	existing homes, businesses and infrastructure. The Environment Agency's Thames Estuary Breach Assessment (2018) reports and outputs were used in the breach assessment undertaken to support **Appendix 11-2: Flood Risk Assessment (Volume 3)**. The Environment Agency's Marsh Dykes model has been updated to incorporate the Proposed Scheme and assess the residual risk of breach. Additionally, a 2D hydrodynamic model has also been developed using the MIKE by DHI Flexible Mesh modelling software and provides further information on the flood depth, extent, and hazard under current baseline conditions and after the Proposed Scheme is constructed in the event of a flood defence breach assuming failure of the local pumping stations. **Appendix 11-2: Flood Risk Assessment (Volume 3)** details the assessment of fluvial and pluvial flood risk associated with the Proposed Scheme using the Environment Agency's Marsh Dykes model (updated to reflect the Proposed Scheme). The modelled flood depths are significantly below the flood level for a breach of the River Thames defences, thus as a result of the embedded mitigation in place to prevent the Proposed Scheme from flooding during a breach of the River Thames Flood Defences, the Proposed Scheme will not be at risk of flooding from the Marsh Dykes.
"We accept the 2018 breach modelling for new development until revised breach flood modelling becomes available based on the new in-channel peak flood modelling."	The Environment Agency's Thames Estuary Breach Assessment (2018) reports and outputs were used in the breach assessment undertaken to support **Appendix 11-2: Flood Risk Assessment**

Comment	Response
	(Volume 3). The Environment Agency's revised breach modelling was not available at the time of writing this assessment as it has not been released for external use. Therefore it has not been used to inform the assessment of the Proposed Scheme.
"If Belvedere Power Station Jetty is to be retained proposals for how the flood defence structures will be maintained where the jetty meets the land should be included."	**Appendix 11-2: Flood Risk Assessment (Volume 3)** details the impacts to Environment Agency managed Flood Defences and main rivers and the effects associated with the demolition or retention (with modifications) of the Belvedere Power Station Jetty (disused). **Appendix 11-2: Flood Risk Assessment (Volume 3)** also details the maintenance of the River Thames Flood Defences if the Belvedere Power Station Jetty (disused) is retained.
"More information on the spatial separation between the flood defences and the proposed new jetty should be provided."	**Appendix 11-2: Flood Risk Assessment (Volume 3)** details the parameters for the Access Trestle where it crosses the River Thames Flood Defences. These demonstrate that the construction and operation of the Access Trestle will not prevent the River Thames Flood Defences beneath/in close proximity to the Access Trestle from being raised to the level required in the Thames Estuary 2100 Plan[70]. **Appendix 11-2: Flood Risk Assessment (Volume 3)** details that the Flue Gas Supply Ductwork which is required to route flue gas from Riverside 2 to the Carbon Capture Facility has to be constructed on/in close proximity to the River Thames Flood Defences, as a result of the location of the proposed stack within for Riverside 2 (currently under construction). The detailed design of the foundations within

Comment	Response
	16m of the River Thames Flood Defences will be undertaken sensitively to ensure that the structural integrity of the defences is not compromised, and approved by the Environment Agency pursuant to its Protective Provisions.
"Proposals for undertaking flood defence crest raising in line with predicted climate change induced sea level rise should be provided."	**Appendix 11-2: Flood Risk Assessment (Volume 3)** details the parameters for the Access Trestle where is crosses the River Thames Flood Defences. These demonstrate that the construction and operation of the Access Trestle will not prevent the River Thames Flood Defences beneath/in close proximity to the Access Trestle from being raised to the level required in the Thames Estuary 2100 Plan[70].
"Before and after breach flood risk modelling should be undertaken. However, appears self-evident that the raising of about 7.4 hectares of land to the south of the power station will increase residual flood risk to some extent to existing homes, businesses and infrastructure. Options to prevent that impact could include: • *Lowering ground levels elsewhere as floodplain compensation, although it is unclear if doner high ground exists where it would be needed.* • *Pumping to discharge flood water to the Thames to reduce residual risk flooding.* • *Improvements to the flood defences, although that is difficult including due to much of the run of the defences being outside the current proposed site extent.*	Baseline and post development breach modelling has been undertaken to understand the implications on residual flood risk to existing homes, businesses and infrastructure. The Environment Agency's Thames Estuary Breach Assessment (2018) reports and outputs were used in the breach assessment undertaken to support **Appendix 11-2: Flood Risk Assessment (Volume 3)**. The Environment Agency's Marsh Dykes model has been updated to incorporate the Proposed Scheme and assess the residual risk of breach. Additionally, a 2D hydrodynamic model has also been developed using the MIKE by DHI Flexible Mesh modelling software and provides further information on the flood depth, extent, and hazard under current baseline conditions and after the Proposed

Comment	Response
• *Minimising the extent of the land raising that will take place in combination with the above. Including an evaluation of whether all of the infrastructure needs to remain dry in the event of a breach of the Thames Tidal Flood Defences."*	Scheme is constructed in the event of a flood defence breach assuming failure of the local pumping stations.
"Other flood risk issues - Proximity to Main Rivers including the dyke up Norman Road."	**Appendix 11-2: Flood Risk Assessment (Volume 3)** details the impacts to Environment Agency managed Flood Defences and main rivers.
"Raising the flood defence for climate change induced sea level rise in line with Thames Estuary 2100 plan should be proposed."	The conclusions of **Appendix 11-2: Flood Risk Assessment (Volume 3)** do not indicate that this is required as part of, or in consequence of, the Proposed Scheme. The Proposed Scheme has been designed such that any future flood defence raising pursuant to the TE2100 Plan[70] would be able to be achieved. **Appendix 11-2: Flood Risk Assessment (Volume 3)** details the parameters for the Access Trestle where is crosses the River Thames Flood Defences.
"Ground raising has the potential to cause rotational slip failures within the weak marsh ground. Where ground raising is proposed close to watercourses the risk of the channels being infilled or partly infilled by such soils failures should be designed out, preferably by providing a suitable offset of 8 metres or more if required for ground stability."	**Appendix 11-2: Flood Risk Assessment (Volume 3)** details the maintenance strips and mitigation measures in place to prevent the risk of channels being infilled as a result of local ground raising.

Comment	Response
"The potential for works close to Great Breach pumping station to hinder proposals for the improvement of that pumping station requires further information and assessment."	The Applicant remains in discussions with the Environment Agency to understand its aspirations for the upgrade works for Great Breach Pumping Station, noting that the Environment Agency has only just started this aspect of works and are at the options appraisal stage at the time of submitting this assessment. The construction programme for the Proposed Scheme as shown in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** can be suitably phased to avoid overlaps with the Environment Agency's current programme that construction will occur prior to 2036.
"The proximity of development to the main rivers should be scoped in."	**Appendix 11-2: Flood Risk Assessment (Volume 3)** provides an assessment of the Proposed Scheme in relation to the proximity to the main rivers and assesses the residual flood risks.
"The PEIR addressed our scoping opinion comments on marine water quality, although please note that our suggestion (Ref Section 2.2.41) related to the of venting oxygen into the Thames estuary (also referred to as the Thames tideway), not into the Tideway Tunnel." *"We are pleased that the ES will contain a full stand-alone WFD Assessment of the proposed scheme (including the detailed Jetty works) as a technical appendix to Chapter 11. We would like to reiterate our advice in relation to the WFD assessment of marine water quality, that piling and associated activities will disturb sediments, and sediments in this part of the river will contain EQSD*	**Chapter 8: Marine Biodiversity (Volume 1)** assess the impacts in relation to marine water quality. Consultation with the Environment Agency has been undertaken to support this chapter and the associated appendices as described in **Table 11-2**. **Chapter 2: Site and Proposed Scheme Description (Volume 1)** provides a description of the types of wastewater and how wastewater will be generated and treated as part of the Proposed Scheme. It is not practicable to vent the oxygen via a diffuser into the

Comment	Response
chemicals and Cefas-list chemicals (at concentrations above Action Level 1), so these activities will not scope out and will require the further impact assessment stage. All dredging activities will certainly require the WFD impact assessment stage."	Thames Tideway Tunnel which is located approximately 5km north west of the Site Boundary. **Appendix 11-4: Coastal Modelling Studies (Volume 3)** details the sediment modelling undertaken of the construction and operation dredging for the Proposed Scheme. The WFD Assessment presented in **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**, has been prepared to address the Environment Agency's comments in regard to water quality.
"An agreement with the Thames Water Utilities LTD (TWUL) should be agreed to connect to the local sewer if proposal opt for Route 1 as the method for discharging wastewater. No operation of Carbon Capture Facility should commence until connection(s) to TWUL supply network agreed and in operation." *"Route 2a as one of the wastewater discharge options to discharge wastewater into the River Thames will require a wastewater discharge permit from the Environment Agency."*	The preferred approach as detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** is for treated wastewater to be discharged to the local foul sewer (with or without treatment, depending on trade effluent consents). The Applicant will continue discussions with Thames Water in relation to treated wastewater discharge. Route 2a, as described in **Chapter 3: Consideration of Alternatives (Volume 1)** is not being progressed as part of the Proposed Scheme.
"Table 11-6: Water Environmental and Flood Risk Magnitude Criteria states that magnitude Major Adverse includes a Loss of flood storage areas, Increase in peak flood level (1 in 100 year event) > 100 mm); and that Moderate Adverse includes increase in peak flood level (1 in 100 year event) > 50 mm*. Based on this the development we believe the impact should be considered Major*	The water environmental and flood risk magnitude criteria, presented within **Table 11-5,** has been updated to reflect the most up to date wording as presented in the Design Manual for Roads and Bridges (DMRB) LA 113 – Road Drainage and the Water Environment[62] that provides the basis of which the assessment has been undertaken. This has removed reference to 'Loss of flood storage areas' and

Comment	Response
Adverse given that the proposed land raising could lead to a loss of flood storage in the event of a breach thereby increasing risk to existing receptors." *"We disagree with the inclusion of modelling tolerance values. Depending on the receptor the Environment Agency will oppose modelled increases in offsite flood levels. To avoid this, the applicant should mitigate for any changes to flood risk offsite through the design of the development. This minimises the risk of increasing flood risk off site, including from the cumulative effect of multiple developments over time."*	instead references changes to peak flood level that would affect identified receptors (noting that this impact may be a result of the loss of flood storage areas). However, loss of flood storage areas has still been taken into account in the assessment of flood risk and to meet the requirements of PPG[26]. The Applicant's understanding of flood storage areas in this context is informed by information provided on the Flood Map for Planning[30] that describes flood storage areas as those that *"act as a balancing reservoir, storage basin or balancing pond. Their purpose is to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel. It may also delay the timing of a flood peak so that its volume is discharged over a longer time interval*". The Applicant has also considered the reference to flood storage areas as provided in the PPG[26] (Paragraph 049), that states "*The loss of floodplain storage is less likely to be a concern in areas benefitting from appropriate flood risk management infrastructure or where the source of flood risk is solely tidal.*" Given the tidal dominance of flooding, protection offered by flood defences and reliance of pumped drainage systems in the Study Area, the Applicant proposes that the reference to flood storage areas as recommended by the Environment Agency would not be appropriate to this Site in this instance. The Applicant has however assessed flood risk to the Site that could be attributable to fluvial sources of flooding and provided recommendation as to how the loss of these relatively minor areas could be mitigated within the Proposed Scheme.

Comment	Response
	Baseline and post development breach modelling has been undertaken to understand the implications on residual flood risk to existing homes, businesses and infrastructure. The Environment Agency's Thames Estuary Breach Assessment (2018) reports and outputs were used in the breach assessment undertaken to support **Appendix 11-2: Flood Risk Assessment (Volume 3)**. The Environment Agency's Marsh Dykes model has been updated to incorporate the Proposed Scheme and assess the residual risk of breach. Additionally, a 2D hydrodynamic model has also been developed using the MIKE by DHI Flexible Mesh modelling software and provides further information on the flood depth, extent, and hazard under current baseline conditions and after the Proposed Scheme is constructed in the event of a flood defence breach assuming failure of the local pumping stations. **Appendix 11-2: Flood Risk Assessment (Volume 3)** details the embedded and additional mitigation as part of the Proposed Scheme and discusses the results of the modelling undertaken to demonstrate that the Proposed Scheme does not increase flood risk.
"A comparison of baseline and post-development modelling results should be made and used as the evidence base to demonstrate there is no detriment from the development proposals. This should be used to carry out this analysis using raw results, without including any buffer for 'modelling tolerance' (model calculation error). The priority should be to mitigate any changes to flood risk in the design	Baseline and post development breach modelling has been undertaken to understand the implications on residual flood risk to existing homes, businesses and infrastructure. The Environment Agency's Thames Estuary Breach Assessment (2018) reports and

Comment	Response
of the development. A robust technical analysis should be provided and reporting to support any change in flood risk which is identified as part of the model calculation error."	outputs were used in the breach assessment undertaken to support **Appendix 11-2: Flood Risk Assessment (Volume 3)**. The Environment Agency's Marsh Dykes model has been updated to incorporate the Proposed Scheme and assess the residual risk of breach. Additionally, a 2D hydrodynamic model has also been developed using the MIKE by DHI Flexible Mesh modelling software and provides further information on the flood depth, extent, and hazard under current baseline conditions and after the Proposed Scheme is constructed in the event of a flood defence breach assuming failure of the local pumping stations.
"We disagree with the assessment of the risk associated with a breach of the Thames Tidal defences as being Slightly Adverse (Not Significant). As above based in our opinion the impact should be considered Major Adverse given that the proposed land raising could lead to a loss of flood storage in the event of a breach thereby increasing risk to existing receptors."	As stated above, the Applicant does not consider the floodplain in the vicinity of the Proposed Scheme that is associated with a breach in the River Thames Flood Defences to be a typical 'flood storage area'. The Applicant has instead assessed the magnitude of impact based on any predicted increase or decrease in flood depth within the Study Area. Baseline and post development breach modelling has been undertaken to understand the implications on residual flood risk to existing homes, businesses and infrastructure. The Environment Agency's Thames Estuary Breach Assessment (2018) reports and outputs were used in the breach assessment undertaken to support **Appendix 11-2: Flood Risk Assessment (Volume 3)**.

Comment	Response
	The Environment Agency's Marsh Dykes model has been updated to incorporate the Proposed Scheme and assess the residual risk of breach. Additionally, a 2D hydrodynamic model has also been developed using the MIKE by DHI Flexible Mesh modelling software and provides further information on the flood depth, extent, and hazard under current baseline conditions and after the Proposed Scheme is constructed in the event of a flood defence breach assuming failure of the local pumping stations. **Appendix 11-2: Flood Risk Assessment (Volume 3)** details the embedded and additional mitigation as part of the Proposed Scheme and discusses the results of the modelling undertaken to demonstrate that the Proposed Scheme does not increase flood risk.
"The impact of 7.4 hectares of ground raising to lift the development platform above the breach floodplain level should be modelled and compensated for. Otherwise, the flood risk to people could increase."	The Applicant has considered guidance provided in the PPG[26] (Paragraph 049), that states in regard to the provision of compensatory flood storage that *"The loss of floodplain storage is less likely to be a concern in areas benefitting from appropriate flood risk management infrastructure or where the source of flood risk is solely tidal', and 'Where development proposals would result in the deflection or constriction of identified flood flow routes, a site-specific flood risk assessment will need to demonstrate that such routes will be safely managed within the site. The impact of development on flood flow routes may also be an important consideration for sites which benefit from the presence of flood risk management infrastructure and where flow routes are likely to affect the site in the*

Comment	Response
	event of a failure or exceedance of such infrastructure". The Applicant has therefore adopted the approach to assess the impact of the Proposed Scheme (including ground raising) on flood risk elsewhere informed by site-specific hydraulic modelling, and recommend appropriate management and mitigation to address any predicted increase in risk. Baseline and post development breach modelling has been undertaken to understand the implications on residual flood risk to existing homes, businesses and infrastructure taking into account the Proposed Scheme and the land raising included. The Environment Agency's Thames Estuary Breach Assessment (2018) reports and outputs were used in the breach assessment undertaken to support **Appendix 11-2: Flood Risk Assessment (Volume 3)**. The Environment Agency's Marsh Dykes model has been updated to incorporate the Proposed Scheme and assess the residual risk of breach. Additionally, a 2D hydrodynamic model has also been developed using the MIKE by DHI Flexible Mesh modelling software and provides further information on the flood depth, extent, and hazard under current baseline conditions and after the Proposed Scheme is constructed in the event of a flood defence breach assuming failure of the local pumping stations.
"The raising of ground levels between Norman Road and Great Breach pumping station could also displace flood water increasing flood risk. More assessment of that risk is required. Until this is	**Appendix 11-2: Flood Risk Assessment (Volume 3)** details the assessment of fluvial and pluvial flood risk in this area associated with

Comment	Response
quantified we consider that risk to be higher than Slight Adverse (not significant).”	the Proposed Scheme using the Environment Agency’s Marsh Dykes model (updated to reflect the Proposed Scheme).
“The extent of possible losses to watercourse channels could change. That could make the impacts more significant.”	**Appendix 11-2: Flood Risk Assessment (Volume 3)** details the assessment of fluvial and pluvial flood risk associated with the Proposed Scheme (including losses to watercourse channels) using the Environment Agency’s Marsh Dykes model (updated to reflect the Proposed Scheme).
Greater London Authority	
“The site may also result in a potential negative impact on flood storage in the event of any breach to the River Thames defences. This could be significant and would need mitigation as part of any development proposals to ensure tidal flood risk to local communities and businesses does not increase as a result of the proposals both during construction and when operational. Furthermore, proposals must also take account of the updated Thames Estuary 2100 plan and allow for future defence raising and/or river wall set back to the required future height.”	Baseline and post development breach modelling has been undertaken to understand the implications on residual flood risk to existing homes, businesses and infrastructure. The Environment Agency’s Thames Estuary Breach Assessment (2018)[52] reports and outputs were used in the breach assessment undertaken to support **Appendix 11-2: Flood Risk Assessment (Volume 3)**. The Environment Agency’s Marsh Dykes model has been updated to incorporate the Proposed Scheme and assess the residual risk of breach. Additionally, a 2D hydrodynamic model has also been developed using the MIKE by DHI Flexible Mesh modelling software and provides further information on the flood depth, extent, and hazard under current baseline conditions and after the Proposed Scheme is constructed in the event of a flood defence breach assuming failure of the local pumping stations.

Comment	Response
	Appendix 11-2: Flood Risk Assessment (Volume 3) details the assessment of fluvial and pluvial flood risk associated with the Proposed Scheme using the Environment Agency's Marsh Dykes model (updated to reflect the Proposed Scheme). The modelled flood depths are significantly below the flood level for a breach of the River Thames defences, thus as a result of the embedded mitigation in place to prevent the Proposed Scheme from flooding during a breach of the River Thames Flood Defences, the Proposed Scheme will not be at risk of flooding from the Marsh Dykes. **Appendix 11-2: Flood Risk Assessment (Volume 3)** details the parameters for the Access Trestle where is crosses the River Thames Flood Defences. These demonstrate that the construction and operation of the Access Trestle will not prevent the River Thames Flood Defences beneath/in close proximity to the Access Trestle from being raised to the level required in the Thames Estuary 2100 Plan[70].
Thames Water	
"Additionally, we note that there has been some initial engagement in relation to water required for cooling purposes of the Development. This has suggested that the peak demand is very high and could create significant challenges from a water production and network perspective. Thames Water therefore needs to work with Cory towards a lower potable water peak demand, while	The Applicant will continue discussions with Thames Water in relation to achievable peak potable water demand. The approach to water management has been and will continue to be discussed with Thames Water. Thames Water is currently in the process of modelling the impacts associated with the proposed water demand on the potable network. In addition, the design of the Proposed Scheme has been developed to achieve a reduction in

Comment	Response
exploring alternative sources of water that could be used for cooling purposes."	water demand in comparison to the early design, which has been achieved by: • increasing the cycle rate of the cooling towers; • reducing cooling demand by switching to dry cooling for CO_2 processing; • pre-cooling the incoming flue gas (for re-heating outlet flue gas and/or use in the Heat Recovery and Heat Transfer System; • rainwater harvesting; and • onsite storage.
Marine Management Organisation (MMO)	
"The MMO does not have any major concerns regarding the matters or receptors as the key ones in terms of coastal processes, namely potentially elevated suspended sediment concentrations and water column water quality, have been scoped in for both construction and operational phases. This will also include deposition within the estuary and any Marine Conservation Zones (MCZs)."	**Appendix 11-4: Coastal Modelling Studies (Volume 3)** provides an assessment of the suspended sediments to demonstrate the range of dispersion and settlement during the construction and operation activities.
"Sediment quality around the proposed dredge pocket and also sediment around the site of disused Belvedere Power Station Jetty should be assessed, as disturbance into the water column could be significant depending on the dredge technique used. For instance, in Option 3 over 180,000 cubic metres (m3) of sediments will be dredged."	**Appendix 11-1: Water Framework Directive Assessment (Volume 3)** provides an assessment in relation to water quality including direct and indirect impacts relating to the biological, hydromorphological and chemical quality indicators within the River Thames. This chapter also summarises the findings and conclusions regarding water quality.

Comment	Response
"The MMO considers that the Outline Emergency Preparedness and Response Plan (OEPRP) should consider the release of all the various chemical into the marine environment (Section 2.6.22). Consideration for bunding should also be made."	The **Outline CoCP (Document Reference 7.4)** contains measures to prevent the release of chemicals into the marine river environment during the construction phase. The **Outline EPRP (Document Reference 7.11)** contains measures to prevent the release of chemicals into the marine river environment during the operation of the Proposed Scheme. Measures regarding bunding of potentially hazardous materials during construction and operation phases of the Proposed Scheme are included in the **Outline CoCP (Document Reference 7.4)** and the **Outline EPRP (Document Reference 7.11)**, respectively. These measures are also detailed in **Section 11.7** and **Section 11.9** of this chapter.
"The report refers to benthic inter- and sub-tidal surveys from which some samples were collected for sediment chemistry analysis alongside particle size. It is stated that analyses were conducted by laboratories validated by the MMO. However, other than this brief description in paragraphs 8.4.15 – 8.4.17, the MMO can find no corresponding resultant data or any other description of the number of samples or results of the analyses. The MMO would expect these data to be published in full in the MMO Results Template in the resulting ES. Therefore, as of the time of writing, it is not possible to substantively comment on these data."	**Appendix 11-1: Water Framework Directive Assessment (Volume 3)** provides the data in the MMO Results Template.

Comment	Response
"The report lists several dredge methods which vary considerably in the extent to which they may lead to increases in suspended sediment concentrations at the dredge site and its immediate vicinity. It should be confirmed if the assessment of this impact pathway will consider the worst-case scenario use of water injection (WID) for all 180,000 m3 of material (i.e., the total anticipated worst-case volume of material that would be removed by WID). The MMO would consider this method to be worst-case for this impact pathway as none of the material dredged would be removed from the water column (as with trailer suction hopper or backhoe)."	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** states that backhoe dredging will be the dredging method to be adopted for the Proposed Scheme and the assessments presented within This Environmental Statement (ES) and supporting appendices are based upon this method.
"The MMO strongly recommends that, if it is decided that WID will be the primary dredge method, that engagement is undertaken with the Port of London Authority (PLA), the Environment Agency (EA) and the Zoological Society of London (ZSL) to ensure that the large volume does not lead to adverse effects on migratory fish."	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** states that backhoe dredging will be the dredging method to be adopted for the Proposed Scheme, rather than WID, and the assessments presented within This Environmental Statement (ES) are based upon this method.
"There are considerable information gaps in the report to fully comprehend the scale of the dredging and possible disposal activity. There is little to no indication as to the depth of material to be removed, when the material was most recently dredged, or any indication as to the potential contaminant levels. Even at this early stage, the MMO would have expected indicative information to be available. At the point of ES, all of this information should be presented clearly and in detail."	**Chapter 2: Site and Proposed Scheme Description (Volume 1)** details the scale of the dredging and the potential disposal methods, as does the **Limits of Dredging Plan (Document Reference 2.11)**. **Appendix 11-1: Water Framework Directive Assessment (Volume 3)** provides an assessment in relation to water quality within the River Thames and provides information regarding sediment sampling (to be agreed with the MMO in consultation with CEFAS prior to commencement of works). Should unacceptable impacts be

Comment	Response
	determined following the sediment sampling then appropriate mitigations measures will be implemented in discussion with the Environment Agency.

11.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

POTENTIAL SIGNIFICANT EFFECTS

11.4.1. As set out in the EIA Scoping Report[31] and PEIR[32], and in light of the assessments undertaken since then, the following effects are considered to be significant and have been considered further in this assessment:

- Construction Phase:
  - Surface Water Features:
    - quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects);
    - quantity of surface water features/flows.
  - Groundwater Features:
    - groundwater quality and quantity (level and flow) of the Secondary A bedrock aquifers (Lambeth Group including Thanet Sand Formation) and superficial deposit aquifers designated Secondary (undifferentiated and Secondary A aquifers (Alluvium, Head Deposits and Taplow Gravel Member)); and
    - groundwater associated users (including licensed, private and unlicenced groundwater abstractions[a].
  - WFD Designated Water Bodies:
    - biological, physico-chemical and hydromorphological quality elements of the WFD designated water bodies (Thames Middle Transitional WFD Water Body and Greenwich Tertiaries and Chalk Groundwater Body).
  - Coastal Processes:
    - Sediment Transport Regime.
  - Flood Risk:
    - breach of the River Thames flood defences;
    - flooding from Marsh Dykes;
    - loss of watercourse channel;
    - flood risk associated with the Proposed Jetty;
    - surface water flooding;
    - groundwater flooding; and
    - artificial sources.
  - Potable water supply:

[a] At the PEIR[32] stage, impacts to groundwater associated users were scoped out as no data had been received from the Environment Agency or local authority. Data received shows groundwater abstractions located within the Groundwater Study Area and so impacts to groundwater associated users has since been scoped into the assessment.

    - increase in demand for potable water[b].
- Operation Phase:
  - Surface Water Features:
    - quality of surface water features (including the biological, physico-chemical and hydromorphological quality aspects); and
    - quantity of surface water features/flows.
  - Groundwater Features:
    - impacts to groundwater flows and levels on the Thanet Sand and Lambeth Group (bedrock) Secondary A aquifers and superficial deposit aquifers designated Secondary Undifferentiated and Secondary A aquifers (Alluvium, Head Deposits and Taplow Gravel Member, respectively); and
    - Groundwater quality of the superficial and bedrock aquifers.
  - WFD Designated Water Bodies:
    - biological, physico-chemical and hydromorphological quality elements of the WFD designated water body (Thames Middle Transitional WFD Water Body and Greenwich Tertiaries and Chalk Groundwater Body).
  - Coastal Processes:
    - Sediment Transport Regime.
  - Flood Risk:
    - breach of the River Thames flood defences;
    - flooding from Marsh Dykes;
    - loss of watercourse channel;
    - flood risk associated with the Proposed Jetty;
    - surface water flooding;
    - groundwater flooding; and
    - artificial sources.
  - Potable water supply:
    - increase in demand for potable water[c].

11.4.2. This chapter assesses the effects to the quality and quantity of groundwater resources associated with surface borne pollutants (such as surface water runoff and spillages). The risks to the quality, quantity and flow of groundwater resources in

[b] At the PEIR[32] stage, impacts to the potable water supply were scoped out. Changes in the design between the PEIR stage and the ES stage, and consultation with Thames Water have meant that there is the potential for impacts to the potable water supply and so impacts to potable water supply during the construction and operation phase have since been scoped into the assessment.

[c] At the PEIR[32] stage, impacts to the potable water supply were scoped out. Changes in the design between the PEIR stage and the ES stage, and consultation with Thames Water have meant that there is the potential for impacts to the potable water supply and so impacts to potable water supply during the operation phase have since been scoped into the assessment.

relation to controlled waters associated with other aspects such as contaminated land are assessed in **Chapter 17: Ground Conditions and Soils (Volume 1)**.

11.4.3. Impacts on surface water quality in the River Thames resulting from the capital and maintenance dredging, including the disposal of material are considered in **Chapter 8: Marine Biodiversity (Volume 1)** and **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**.

11.4.4. The disposal of dredged material is covered in **Chapter: 16 Materials and Waste (Volume 1)** and **Chapter 17: Ground Conditions and Soils (Volume 1)**.

MATTERS SCOPED OUT

11.4.5. The following effects are considered unlikely to be significant and therefore have not been considered further in this assessment:

- Impacts on groundwater or surface water quality and quantity resulting from the water supply options. As detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and **Chapter 3: Consideration of Alternatives (Volume 1)**, the feed water supply will likely use a combination of potable water from Thames Water (Water Supply Zone: 0105), and recycled effluent from the Carbon Capture Facility. Thus, no impacts on ground or surface waters are expected. Other impacts to groundwater features including groundwater flows and groundwater quality as listed above are included within the assessment*.
- Impacts to Groundwater Dependent Terrestrial Ecosystems (GWDTEs) including springs[d].
- Changes to sediment transport processes associated with propeller wash and vessel movements following consultation with the Environment Agency*.
- Ponds beyond the Site Boundary along with those within Crossness LNR (i.e. those on the left hand/western bank of the Great Breach Dyke) have been scoped out due to the predominant flow directions in the key watercourses. However, measures to prevent a spillage event in the wider network are included in the **Outline CoCP (Document Reference 7.4)***.

11.4.6. The points marked with a * have been amended since the publication of the Scoping Report[29] and the PEIR[32] based upon the evolution of the design of the Proposed Scheme.

[d] The impacts have been scoped out based on a review of the Environment Agency's GWDTE Map of England. No GWDTE's have been identified within 1km of the Proposed Scheme. The closest GWDTE (Abbey Wood SSSI), located approximately 2km to the south, has been scoped out. The Inner Thames Marshes SSSI is approximately 2km northeast and is unlikely to be affected by the Proposed Scheme and is separated by the River Thames. Furthermore, there are no springs known to be situated in proximity to the Site. On this basis, GWDTE and impacts to springs are not considered further in the assessment for this ES, these have been agreed with the Planning Inspectorate through the Scoping Report[31] and PEIR[32].

BASELINE DATA COLLECTION

11.4.7. Site walkover surveys, surface sediment sampling surveys from within the River Thames and a desk based data collection exercise has been undertaken, including a review of available information to determine the baseline conditions in the relevant geographical areas of effect.

Site Visits and Surveys

11.4.8. Intertidal walkover surveys were undertaken on the 4th November 2022 and the 17th May 2023. The surveys comprised a general walkover of the River Thames noting changes in ecological and physical characteristics. More information regarding the intertidal walkover surveys is available in **Chapter 8: Marine Biodiversity (Volume 1)**.

11.4.9. Surface sediment sampling from within the River Thames was undertaken on the 21st September 2023 at numerous locations over the dredge area. More information regarding the surface sediment sampling undertaken is available in **Chapter 8: Marine Biodiversity (Volume 1)**.

11.4.10. A general site walkover was undertaken on the 29th November 2023. The site walkover comprised of a visual inspection of the watercourses, floodplain, flood defences and River Thames in and around the Site.

Baseline Data

11.4.11. The key sources of information used to determine the baseline water environment and flood risk conditions are:

- Environment Agency's online Flood Map for Planning[33];
- Environment Agency's online Long-Term Risk of Flooding[34];
- Environment Agency's online Flood Risk from Reservoirs Map[35];
- Environment Agency's Recorded Flood Outlines Map[36];
- WFD status and objectives from the Environment Agency's online Catchment Data Explorer[37];
- WFD status and objectives from the Environment Agency's Thames River Basin District River Basin Management Plan[38];
- Ordnance Survey Mapping[39];
- Environment Agency's LiDAR Digital Terrain Model[40];
- Department for Environment, Food and Rural Affairs (DEFRA) MAGIC Online Mapping[41];
- British Geological Survey (BGS) Geology of Britain Viewer[42];
- BGS Geological Map Sheet 257 and Map Sheet 271[43];
- Riverside Data Centre Ground Investigation Report[44];

- Riverside Energy Park Geotechnical Interpretive Report and Contaminated Land Report[45];
- Groundsure Report[46];
- London Borough of Bexley Level 1 SFRA[6];
- National Library of Scotland, Historical Mapping[47];
- Flood Estimation Handbook Web Service[48];
- Cory Riverside Energy Park Environmental Statement Chapter 12: Hydrology, Flood Risk and Water Resources and associated Technical Appendices[49];
- Riverside Resource Recovery Facility Tidal Flood Risk Assessment[50];
- Thames Estuary 2100 (TE2100) In-channel Extreme Water Levels[51];
- Thames Estuary Breach Assessment (2018)[52];
- Environment Agency's 2020 Marsh Dykes model[53];
- Local bathymetric data of the area immediately surrounding the Site Boundary sourced from the Port of London Authority (PLA) chart 327[54];
- Bathymetric data downstream and upstream of the site boundary sourced from C-MAP Admiralty Chart Data[55];
- Surface water level and current velocity predictions taken from UK Hydrographic Office Admiralty TotalTide software[56];
- Current aerial photography[57];
- Environment Agency Ecology Explorer[58];
- Environment Agency Water Quality Archive[59]; and
- Various literature sources, including published articles and technical reports, these are detailed in the applicable Technical Appendices.

ASSESSMENT METHODOLOGY

11.4.12. Based on the potential significant effects set out above, the scope of the assessment is set out below. The assessment presented within this chapter considers potential impacts from the construction and operation of the Proposed Scheme alongside Riverside 1 and Riverside 2.

11.4.13. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, two options for the construction programme of the Proposed Scheme are being considered: Option 1 and Option 2. The estimated construction period is approximately 60 months (five years) for Option 1 and approximately 42 months (three and a half years) for Option 2. For the purposes of the water environment and flood risk assessment there is no discernible differences between the two options and so the assessment does not distinguish between the two options and the conclusions for both options are the same.

11.4.14. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, two options for the design of the Carbon Capture Facility are being considered. One option is for individual lines to be connected to the exhaust stacks for Riverside 1 and

Riverside 2, with two individual Stack(s) for the Carbon Capture Facility. A second option is for the two lines from Riverside 1 and Riverside 2 to be combined into a single Stack at the Carbon Capture Facility. For the purposes of this assessment, there is considered to be no difference between the two options in terms of predicted effects on the water environment and flood risk arising from the Proposed Scheme.

11.4.15. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, the choice between demolition or retention of the Belvedere Power Station Jetty (disused) will not change the findings and conclusions of the assessment of impacts and effects reported within this chapter. If the structure is demolished, this will occur during the construction phase and be managed as part of the **Outline CoCP (Document Reference 7.4)**. **Appendix 11-1: Water Framework Directive Assessment (Volume 3)** and **Appendix 11-4: Coastal Modelling Studies (Volume 3)** consider both scenarios. Both scenarios are also considered in **Appendix 11-2: Flood Risk Assessment (Volume 3)** which determined that there would be negligible difference between the options. **Appendix 11-2: Flood Risk Assessment (Volume 3)** also considered the impact on the River Thames Flood Defences in both scenarios and determined a negligible effect.

Surface Water Features

11.4.16. The assessment of potential effects on surface water features has been informed through the use of publicly available information. The water quantity effects are addressed qualitatively, and water quality effects are assessed quantitatively associated with contaminated sediment and sediment dispersion; and both qualitatively and quantitatively (via the SuDS Simple Index Approach) for the operation of the Proposed Scheme.

Groundwater Features

11.4.17. An assessment of potential impacts of the Proposed Scheme on groundwater quantity and quality has been undertaken with respect to groundwater attributes and other groundwater dependent receptors.

11.4.18. An assessment of the potential impacts from localised excavations for the Proposed Scheme (i.e. intrusive earthworks such as sheet piling) on groundwater resources and aquifers has been assessed in this Environmental Statement (ES) **(Appendix 11-3: Groundwater Impact Assessment (Volume 3)**). Reference is made to the risks associated with such activities (including impacts to groundwater quality, quantity and groundwater flooding) and measures that will be adopted to avoid or reduce/minimise the risk of likely significant effects occurring.

WFD Designated Water Bodies

11.4.19. A WFD Assessment (**Appendix 11-1: Water Framework Directive Assessment (Volume 3)**) for the Thames Middle Transitional WFD Water Body and Greenwich

Tertiaries and Chalk Groundwater Body forms **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**.

Coastal Processes

11.4.20. A detailed hydrodynamic site-specific modelling study has been undertaken in the 'MIKE by DHI' software package to assess the sensitivity and magnitude of any changes to the hydrodynamics of the River Thames during the construction and operation phases of the Proposed Scheme. This forms **Appendix 11-4: Coastal Modelling Studies (Volume 3)**. This has involved:

- development of a 2D hydrodynamic model using the 2023 MIKE by DHI, Flexible Mesh (FM) hydrodynamic (HD) modelling software, PT (Particle Transport) and MT (Mud Transport) modules;
- calibration and validation of the baseline model to ensure water levels and currents were within the specified limits as defined in the Framework of Water Research FR 0374 (1993) standards[60] for estuarine model calibration. Model validation was carried out using measurements from the Environment Agency's tide gauge at Erith Wharf (Station ID 9154)[61] approximately 3km downstream of the Proposed Scheme. Data from September to October 2022 was used covering several spring neap cycles; and
- development of 2D hydrodynamic models for the proposed scenarios of the Proposed Scheme and comparison of the outcomes against the baseline conditions.

11.4.21. The coastal model extents cover the entire inner Thames reach with the upstream tidal boundary located at Richmond and extending downstream to Coryton. The model extents have been selected to ensure that the boundary locations are sufficiently far away to avoid impacting the outcomes from the modelling investigation.

11.4.22. To understand the impacts of both the construction and operational dredging activities (concentration and dispersion extent), a dredge dispersion modelling investigation has been undertaken using the MIKE by DHI FM Particle Tracking (PT) model.

11.4.23. A further investigation of the mobility of the priority mudflat adjacent to the Proposed Jetty and the Belvedere Power Station Jetty (disused) was undertaken using the MIKE Mud Transport (MT) model.

Flood Risk

11.4.24. A Flood Risk Assessment (FRA) has been prepared and forms **Appendix 11-2: Flood Risk Assessment (Volume 3)**. The assessment considers the potential likely significant effects of the Proposed Scheme on flood risk from all sources to people and property elsewhere, as well as the risk of flooding to the Proposed Scheme.

11.4.25. **Appendix 11-2: Flood Risk Assessment (Volume 3)** has been informed by the outputs from the Environment Agency's 2018 River Thames Estuary Breach Assessment, along with the outputs and further modelling utilising the Environment

Agency's 2020 Marsh Dykes model and a site-specific breach model developed in the 'MIKE by DHI' software package.

Potable Water Supply

11.4.26. The assessment considers the ability of Thames Water to supply the potable water required for the operation of the Proposed Scheme. This assessment has been undertaken through consultation and engagement with Thames Water and details how a combination of sources has been considered to reduce the potable water demand and enable Thames Water to fulfil the expected water demands of the Proposed Scheme and fulfil its statutory duties across the Water Resource Zone.

Drainage Infrastructure

11.4.27. The **Outline Drainage Strategy (Document Reference 7.2)** sets out the surface water and foul water proposals for the Proposed Scheme, based on the indicative design details available at this point in time.

SIGNIFICANCE CRITERIA

11.4.28. The assessment of the effects during both the construction and operation phases has been undertaken following the principles set out within the Design Manual for Roads and Bridges (DMRB) LA 113 – Road Drainage and the Water Environment[62]. Although not directly applicable to the nature of the Proposed Scheme, the DMRB guidance provides a good basis for assessing effects of developments on the water environment and flood risk.

11.4.29. The DMRB LA 113[62] promotes the following approach:

- Estimation of the sensitivity of the receptor. The sensitivity of the feature or resource is based on the value and sensitivity of the feature or resource as shown in **Table 11-4** below.
- Estimation of the magnitude of the impact. The magnitude of an impact is estimated based on the potential size or scale of change compared to the baseline and is independent to the sensitivity of the receptor as shown in **Table 11-5** below.
- Assessment of the significance of the effect. The overall significance of the effect is determined by combining the sensitivity of the receptor and the magnitude of the impact.

Table 11-4: Water Environment and Flood Risk Sensitivity Criteria

Receptor Sensitivity	Criteria	Examples
Very High	Nationally significant	• WFD classification shown in a River Basin Management Plan (RBMP) and $Q_{95} \geq 1.0\ m^3/s$. • Site protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site,

Receptor Sensitivity	Criteria	Examples
	receptor of high sensitivity	salmonid water)/Species protected by EC legislation.
		• Principal aquifer providing a regionally important resource and/or supporting a site protected under EC and UK Legislation. • Groundwater locally supports GWDTE. • SPZ 1.
		• Essential infrastructure or highly vulnerable development.
		• Water Resource Zone with a High Water Deficit
High	Locally significant receptor of high sensitivity	• Watercourse having a WFD classification shown in a RBMP and Q_{95} <1. 0 m^3/s. • Species protected under EC or UK legislation.
		• Principal aquifer providing locally important resource or supporting a river ecosystem. • Groundwater supports GWDTE. • SPZ 2.
		• More vulnerable development.
Medium	Of moderate quality and rarity	• Watercourses not having a WFD classification shown in a RBMP and Q_{95} >0.001m3 /s.
		• Aquifer providing water for agricultural or industrial use with limited connection to surface water. • SPZ 3.
		• Less vulnerable development.
		• Water Resource Zone with a Medium Water Deficit
Low	Lower Quality	• Watercourses not having a WFD classification shown in a RBMP and Q_{95} ≤0.001m3 /s.
		• Unproductive strata.
		• Water compatible development.
		• Water Resource Zone with a Low Water Deficit.

Receptor Sensitivity	Criteria	Examples
Negligible	Attribute of very low quality	• Water features within the Proposed Scheme which form part of the drainage system with no other allocation.

Table 11-5: Water Environmental and Flood Risk Magnitude Criteria

Magnitude	Criteria	Example
Major Adverse	Results in loss of attribute and/or quality and integrity of the attribute	• Change to the environmental status/classification of a water feature, including water quality classification. • Loss or extensive change to a fishery/designated nature conservation site. • Loss of regionally important public water supply. • Reduction in surface water body or groundwater WFD classification. • Loss of, or extensive change to, an aquifer. • Loss of regionally important groundwater supply. • Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies. • Loss or significant damage to major structures through subsidence or similar effects. • Increase in peak flood level (1 in 100 year event) > 100mm)[a]. • Changes to site resulting in an increase in surface/foul water discharge/runoff of >75% with insufficient capacity in the flood/sewerage network. • Water demand that would result in an adverse change to the Water Deficit category across the Water Resource Zone.
Moderate Adverse	Results in effect on integrity of attribute, or loss of part of attribute	• Partial loss in productivity of a fishery. • Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. • Contribution to reduction in water body WFD classification. • Partial loss or change to an aquifer. • Pollution of a receiving water body, but insufficient to change the environmental status/classification, including water quality classification.

Magnitude	Criteria	Example
		• Changes to site resulting in an increase in surface/ foul water discharge/runoff of >50% with insufficient capacity in the flood/sewerage network. • Increase in peak flood level (1 in 100 year event) >50mm[a]. • An increase in water demand that will not result in a change to the Water Deficit category across the Water Resource Zone but is not policy compliant and cannot be accommodated by the Statutory Water Undertaker.
Minor Adverse	Results in some measurable change in attributes, quality or vulnerability	• Potential low risk of some pollution to a surface water or groundwater body, but insufficient to cause loss in quality, fishery productivity or biodiversity. • An increase in water demand that will not result in a change to the Water Deficit category across the Water Resource Zone, but is not policy compliant and can be accommodated by the Statutory Water Undertaker. • Changes to site resulting in an increase in surface or foul water discharge/runoff of >25% with insufficient capacity in the flood/sewerage network. • Increase in peak flood level (1 in 100 year event) > 10mm[a].
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity	• The Proposed Scheme is unlikely to affect the integrity of the water environment. • No measurable impact upon an aquifer. • Negligible change in peak flood level (1 in 100 year event) <±10mm[a]. • An increase in water demand that will not result in a change to the Water Deficit category across the Water Resource Zone is policy compliant and can be accommodated by the Statutory Water Undertaker.
No Change	Results in no change to the receptor	• No predicted positive or negative impact to the receptor. • Water demand that would result in no change to the Water Deficit category across the Water Resource Zone.
Minor Beneficial	Results in some beneficial effect on attribute or a	• Potential for slight reduction in pollution to a surface water or groundwater body, but insufficient to cause noticeable benefit in quality, fishery productivity or biodiversity.

Magnitude	Criteria	Example
	reduced risk of negative effect occurring	• Reduction of groundwater hazard to existing structures. • Reductions in waterlogging and groundwater flooding. • Changes to site resulting in a decrease in surface/ foul water discharge/runoff >25%. • Decrease in peak flood level (1 in 100 year event) >10mm[a]. • A decrease in water demand that will not result in a change to the Water Deficit category across the Water Resource Zone is policy compliant.
Moderate Beneficial	Results in moderate improvement of attribute quality	• Moderate improvement to a fishery/designated nature conservation site. Potential increase in the productivity of a fishery. • Reduced pollution of a receiving water body, but insufficient to change the environmental status/ classification, including water quality classification. • Improvement in groundwater Catchment Abstraction Management Strategy (CAMS) (or equivalent) classification. • Support to significant improvements in damaged GWDTE. • Changes to site resulting in a decrease in surface/ foul water discharge/runoff >50%. • Decrease in peak flood level (1 in 100 year event) > 50mm[a]. • A significant decrease in water demand that will not result in a change to the Water Deficit category across the Water Resource Zone is policy compliant.
Major Beneficial	Results in major improvement of attribute quality	• Significant improvement to a fishery/designated nature conservation site. • Removal of existing polluting discharge or removing the likelihood of polluting discharges occurring. • Change to the environmental status/classification of a water feature, including water quality classification. • Changes to site resulting in a surface/foul water decrease in discharge/runoff of >75%. • Decrease in peak flood level (1 in 100 year event) > 100mm[a].

Magnitude	Criteria	Example
		• Water demand that would result in a beneficial change to the Water Deficit category across the Water Resource Zone.

Note:

[a] In some circumstances consideration may need to be given to model accuracy and tolerance, rather than absolute terms. Where this is required, it is detailed in the assessment.

11.4.30. The significance of potential impacts is classified by considering both the importance (sensitivity) of the receptor (**Table 11-4**) and the magnitude of the impact (**Table 11-5**), using the matrix shown in **Table 11-6** below, adapted from Table 3.8.1 of DMRB LA 104[63]. Noting that, where the significance of the effect is described as between two levels, professional judgement is used to identify the level of significance.

11.4.31. Only Moderate and Major effects are considered to be significant in EIA terms.

Table 11-6: Water Environment and Flood Risk Significance Criteria

		Magnitude of Impact				
		Major	**Moderate**	**Minor**	**Negligible**	**No Change**
Receptor Sensitivity	**Very High**	Very Large	Large or Very Large	Moderate or Large	Slight	Neutral
	High	Large or Very Large	Moderate or Large	Slight or Moderate	Slight	Neutral
	Medium	Moderate or Large	Moderate	Slight	Neutral or Slight	Neutral
	Low	Slight or Moderate	Slight	Neutral or Slight	Neutral or Slight	Neutral
	Negligible	Slight	Neutral or Slight	Neutral or Slight	Neutral	Neutral

11.5. STUDY AREA

11.5.1. Study Areas have been identified for surface water features, groundwater, WFD designated water bodies, coastal processes and flood risk. A description of each of the Study Areas is provided in the following sections and shown in **Figure 11-1: Water Environment Study Area (Volume 2)**.

Surface Water Features

11.5.2. The Site is located within a discrete surface water catchment, within which the water levels and flows are controlled by two Environment Agency Pumping Stations (Great Breach and Green Level) that outfall to the River Thames (**Figure 11-1: Water Environment Study Area (Volume 2)**). It is considered that reversal of flows could occur within the connected surface water features, depending on the tidal flow and pumping regime. As such, the Surface Water Study Area (for the construction and operation phases) includes extents of the River Thames 500m upstream and downstream of the two Environment Agency Pumping Stations and the network of surface watercourses/drains between the two Environment Agency Pumping Stations. The Proposed Scheme is located between the Great Breach and Green Level Pumping Stations and therefore is fully encompassed by the Surface Water Study Area.

Groundwater Features

11.5.3. The Groundwater Study Area is generally 2km from the Site Boundary; but not beyond the north bank of the River Thames, as the river would act as a barrier to groundwater impacts being conveyed upgradient on the north bank.

WFD Designated Water Bodies

11.5.4. The WFD designated water bodies Study Area covers approximately 1km of the River Thames from approximately TQ 49380 80761 at the upstream extent of the Site Boundary to approximately TQ 50314 80616 at the downstream extent of the Site Boundary. This is based on the effects considered likely to arise from the location of the Proposed Scheme.

11.5.5. The Proposed Scheme could potentially impact the following water bodies:

- Thames Middle Transitional Water WFD Water Body (GB530603911402), which lies within the Tidal Thames Transitional and Coastal (TraC) Operational Catchment, the Thames TraC Management Catchment, and the Thames River Basin District; and
- Greenwich Tertiaries and Chalk (GB40602G602500) groundwater water body lies in the Greenwich Tertiaries Operational Catchment, the Thames Groundwater Management Catchment, and the Thames River Basin District.

Coastal Processes

11.5.6. The coastal processes model covers the reach of the River Thames between Richmond (approximately 32km west of the Site Boundary) and Coryton (approximately 27km east of the Site Boundary), and this forms the Coastal Processes Study Area.

Flood Risk

11.5.7. The Flood Risk Study Area is the flood cell, which extends approximately 6km from the Green Level Pumping Station outfall in the east, approximately along Gilbert Road to the south to Lake 5 Pumping Station/Gallion's Park/Broad Swing Lock in the west and to the north bank of the River Thames in the north. It is expected that any flood risk effects associated with the Proposed Scheme would be localised within this flood cell due to scale of the River Thames and the defences in-situ.

Potable Water Supply

11.5.8. The site falls within the Thames Water London Water Resource Zone, which forms the Potable Water Study Area.

Drainage Infrastructure

11.5.9. The **Outline Drainage Strategy (Document Reference 7.2)** sets out the surface water and foul water proposals for the Proposed Scheme.

SENSITIVE RECEPTORS

11.5.10. **Table 11-7** and **Figure 11-2: Surface Water Features (Volume 2)** show the sensitive receptors identified within the study areas described above:

Table 11-7: Water Environment and Flood Risk Sensitive Receptors

Receptor	Description	Sensitivity
Surface Water Features		
River Thames (including Thames Middle Transitional WFD Water Body)	Main River. 'Moderate' WFD classification. Species protected by EC legislation (European Eel).	Very High
Marsh Dykes (Main Rivers)	Main Rivers. No WFD classification. Species protected by EC legislation (European Eel). Located within Crossness LNR.	Very High
Marsh Dykes (Ordinary Watercourses)	Ordinary watercourses. No WFD classification. Species protected by EC legislation (European Eel). Located within Crossness LNR.	Very High
Ponds (located within the Site Boundary along with those within Crossness LNR)	No known species protected by EC legislation. Located within Crossness LNR.	Medium
Groundwater Features		

Receptor	Description	Sensitivity
Superficial Deposit aquifers designated Secondary (undifferentiated) aquifers (Alluvium) and Secondary A aquifers (Taplow Gravel Member)	Secondary A aquifers supporting water supplies at a local rather than strategic scale – industrial water supply locally with shallow groundwater levels. These superficial deposits are in hydraulic continuity with the River Thames and groundwater level within these deposits is influenced by the tidal fluctuations of the River Thames.	Medium
Bedrock aquifers designated Secondary A aquifers (Harwich Formation (Blackheath Member) Lambeth Group and Thanet Formation)	Secondary A aquifers supporting water supplies at a local rather than strategic scale – industrial water supply locally with shallow groundwater levels. These bedrock aquifers are in hydraulic continuity with the underlying Chalk Group (forming the basal sands) and in some locations across the Site in hydraulic continuity with the overlying superficial deposits.	Medium/ High[a]
Unproductive Strata – London Clay Formation	Unproductive/non-aquifer. Not considered a target for supply (locally).	Low
Bedrock aquifer designated a Principal aquifer (Chalk Group)	A principal aquifer that is in hydraulic continuity with the overlying basal sands aquifer (comprising Thanet Formation & Lambeth Group). The Chalk Group aquifer will provide strategic supply and/or baseflow to rivers. WFD Groundwater body classified as 'Poor' overall status.	High
Groundwater Abstractions for non-potable use	Non-potable, industrial water supplies within the Groundwater Study Area.	Medium

Receptor	Description	Sensitivity
Greenwich Tertiaries and Chalk WFD Groundwater Body	'Poor' WFD Classification.	Medium
Flood Risk		
NPPF Less vulnerable	Retail outlets, general industry, storage and distribution, restaurants and cafes	Medium
NPPF More vulnerable	Residential properties, hospitals, waste management facilities for hazardous waste.	High
NPPF Essential infrastructure	Essential transport routes including the A2016 eastern way and railway infrastructure. The Proposed Scheme.	Very High
NPPF water compatible	LNR, flood controlled infrastructure, docks, marinas and wharfs, amenity open spaces and water and sewerage infrastructure.	Low
Potable Water Supply		
Potable Water Supply/London Water Resource Zone	The Thames Water Resource Management Plan (Draft)[64] details that the London Water Resource Zone is at High Water Deficit.	Very High
Notes: [a] High where superficial Secondary A aquifers are considered to be in hydraulic continuity with underlying Principal Chalk Group aquifer. [b] Review of desk based mapping indicates no development located within the Flood Risk Study Area that would be classified as NPPF highly vulnerable.		

11.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

Surface Water Features

11.6.1. There are main rivers, ordinary watercourses and ponds located within both the Site and the Surface Water Study Area, as summarised below. The Surface Water Study Area is described in **Paragraph 11.5.2** in **Section 11.5**.

11.6.2. The main rivers located within the Surface Water Study Area are labelled in **Figure 11-2: Surface Water Features (Volume 2)** and listed in **Table 11-8** below.

Table 11-8: Main Rivers Located within the Study Area

Main River	Local Name	Map Reference	Distance from Site Boundary	Interactions with the Proposed Scheme
River Thames	River Thames	N/A	Located within the Site.	Access Trestle/Jetty and the potential demolition of the Belvedere Power Station Jetty (disused).
Norman Road Stream	N/A	MR4	Located within the Site.	Located between the Carbon Capture Facility and Norman Road, the watercourse receives surface water runoff from Riverside 1 and Riverside 2.
Norman Road River	Great Breach Dyke North	MR1	Located within the Site.	This is downstream of Norman Road Stream and is downstream (located to the south) of where Norman Road Stream flows under Norman Road and is located between Norman Road and the Iron Mountain Records Storage and Asda Access Road.
Mulberry Way River	N/A	MR3	Located within the Site.	Located to the south of the Carbon

Main River	Local Name	Map Reference	Distance from Site Boundary	Interactions with the Proposed Scheme
				Capture Facility and to the east of the Mitigation and Enhancement Area.
Belvedere Stream	N/A	MR5	Located within the Site.	Located on the eastern Site Boundary, no interactions expected with the Proposed Scheme.
Great Breach Lagoon	Great Breach Lagoon	MR2	Located within the Site.	This forms part of the Mitigation and Enhancement Area.
Great Breach Dyke North Culvert	Great Breach Dyke North	MR12	Located within the Site.	This watercourse is located within the Mitigation and Enhancement Area. The watercourse is the rising main from the Great Breach Pumping Station to the River Thames.
Great Breach Dyke West	Great Breach Dyke West	MR11	Located within the Site.	This watercourse is located within and along the western boundary of the Mitigation and Enhancement Area.

11.6.3. The ordinary watercourses located within the Study Area are labelled in **Figure 11-2: Surface Water Features (Volume 2)** and listed in **Table 11-9** below.

Table 11-9: Ordinary Watercourses Located within the Study Area

Ordinary Watercourse	Local Name	Map Reference	Distance from Site Boundary	Interactions with the Proposed Scheme
North Dyke	North Dyke	OW4	Located within the Site.	Forms the northern boundary of the Carbon Capture Facility.

Ordinary Watercourse	Local Name	Map Reference	Distance from Site Boundary	Interactions with the Proposed Scheme
Stable Paddock Ditch	North Dyke	OW6	Located within the Site.	Located within the Mitigation and Enhancement Area.
West Paddock Ditch	West Paddock Ditch	OW3	Located within the Site.	Located within the Mitigation and Enhancement Area.
Borax South	N/A	OW11	Located within the Site.	Forms the western boundary of the Carbon Capture Facility.
Iron Mountain Ditch	N/A	OW7	Located within the Site.	Located within the boundary of the Carbon Capture Facility.
Iron Mountain Ditch	N/A	OW12	Located within the Site.	Located between Riverside 1 and the Site Boundary.
Borax North	N/A	OW15	Located within the Site.	Located within the boundary of the Carbon Capture Facility.
Norman Road Field	N/A	OW16	Located within the Site.	Located within the boundary of the Carbon Capture Facility.
Ditch Thames C	N/A	OW17	Located within the Site.	Located within the boundary of the Carbon Capture Facility.
Horse Head Ditch	Horse Head Dyke	OW5	Partially located approximately within the Site.	Partially located within the Mitigation and Enhancement Area.
Great Breach Ditch	N/A	OW10	Located approximately 10m west from the Site Boundary.	No interaction.
Reedbed Dyke	Reedbed Dyke	OW2	Located approximately 10m west from	No interaction.

Ordinary Watercourse	Local Name	Map Reference	Distance from Site Boundary	Interactions with the Proposed Scheme
			the Site Boundary.	
Reedbed Ditch 1	N/A	OW8	Located approximately 20m west from the Site Boundary.	No interaction.
Reedbed Ditch 2	N/A	OW9	Located approximately 20m west from the Site Boundary.	No interaction.
Eastern Way Ditch	N/A	OW13	Located approximately 60m south from the Site Boundary.	No interaction.
Lidl Ditch	N/A	OW14	Located approximately 225m east from the Site Boundary.	No interaction.

11.6.4. The ponds located within the Study Area are labelled in **Figure 11-2: Surface Water Features (Volume 2)** and are listed in **Table 11-10** below:

Table 11-10: Ponds Located within the Study Area

Ponds	Local Name	Map Reference	Distance from Site Boundary	Interactions with the Proposed Scheme
Pond 1	N/A	Pond 1	Located within the Site.	Located outside of the boundary of the Carbon Capture Facility and within the Mitigation and Enhancement Area.
Pond 2	N/A	Pond 2	Located within the Site.	Located outside of the boundary of the Carbon Capture Facility and within the Mitigation and Enhancement Area.

Ponds	Local Name	Map Reference	Distance from Site Boundary	Interactions with the Proposed Scheme
Pond 3	N/A	Pond 3	Located within the Site.	Located within the Mitigation and Enhancement Area.
Pond 4	N/A	Pond 4	Located within the Site.	Located within the Mitigation and Enhancement Area.
Pond 5	N/A	Pond 5	Located within the Site.	Located within the Mitigation and Enhancement Area.
Pond 6	Norman Road Wader Scrape	Pond 6	Located within the Site.	Located within the Mitigation and Enhancement Area.
Pond 7	N/A	Pond 7	Located within the Site.	Located within the Mitigation and Enhancement Area.
Great Breach Pond	N/A	Great Breach Pond	Located approximately 140m from the Site Boundary.	No interaction.
Crossness Pond 1	Island Field Lagoons	Crossness Pond 1	Located within the Site.	Located within the Mitigation and Enhancement Area.
Crossness Pond 2	Island Field Lagoons	Crossness Pond 2	Located within the Site.	Located within the Mitigation and Enhancement Area.
Crossness Pond 3	N/A	Crossness Pond 3	Located within the Site.	Located within the Mitigation and Enhancement Area.
Crossness Pond 4	N/A	Crossness Pond 4	Located within the Site.	Located within the Mitigation and Enhancement Area.
Education Pond	Education Pond	Education Pond	Located approximately 40m from the Site Boundary.	No interaction.

Ponds	Local Name	Map Reference	Distance from Site Boundary	Interactions with the Proposed Scheme
Wader Scrape	Wader Scrape	Wader Scrape	Located approximately 10m from the Site Boundary.	No interaction.

11.6.5. The surface water connectivity within the Surface Water Study Area is interlinked and the Environment Agency has advised that the best representation of the understanding is provided within the Marsh Dykes Model Report. This confirms that there are a number of open watercourses (as identified in **Table 11-8** and **Table 11-9**) which discharge to the River Thames via two Environment Agency Pumping Stations located in the northwest area of the Site (Great Breach Pumping Station) and approximately 1.2km to the southeast of the Site Boundary (Green Level Pumping Station). Each Environment Agency Pumping Station has an accompanying outfall; these are located approximately 80m to the west of the Site Boundary (Great Breach Outfall) and approximately 1.2km to the southeast of the Site Boundary (Green Level Outfall). Upstream of these open watercourses, there are a number of culverted watercourses, surface water sewers, combined sewers and lakes. The location of the Environment Agency Pumping Stations and outfalls are shown on **Figure 11-1: Water Environment Study Area (Volume 2)**.

11.6.6. Information regarding the water quality and the quality of bed sediment of the River Thames is available in **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**.

11.6.7. Information regarding the ecological quality of the watercourses located within the Site Boundary and the Surface Water Study Area is available in **Chapter 7: Terrestrial Biodiversity (Volume 1)**. The potential presence of European Eels within the watercourses located within the Site Boundary has been taken into account into the sensitivity of the sensitive receptors in **Table 11-7**.

11.6.8. No water quality information or monitoring is available from the Environment Agency for Crossness LNR.

Surface Water Abstractions

11.6.9. Two active licenced surface water abstraction points are located approximately 15m and 30m to the west of the Site Boundary. The surface water abstractions are from the Great Breach Dyke North, for use by Thames Water as make up/top up water[46]. No other licenced abstractions are located within 500m of the Site Boundary.

Surface Water Discharges

11.6.10. There are two active licenced surface water discharges located within the Site that flow into the River Thames; one is associated with site drainage at the Lidl warehouse and the other is a temporary licence held by Cory for the dewatering required for the construction of Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken). Outside of the Site, there are two additional discharges on the southern bank of the River Thames; the first is approximately 300m to the west for the final/treated effluent from the Crossness Sewage Treatment Works, owned and managed by Thames Water[46], and the second is approximately 460m east for a water company (assumed to be Thames Water) to pump sewage discharges from a pumping station located on Crabtree Manorway. On the northern bank of the River Thames there are additional discharges for treated/final sewage effluent from a transfer facility on Frog Island which discharges to the ground/groundwater approximately 465m north of the Site Boundary. Historically there have been additional discharges, the licences for which are now revoked or surrendered.

11.6.11. Engagement with the PLA identified a disused outfall structure located approximately 455m to the southwest of the Site Boundary, associated with the former Belvedere Power Station. The PLA has confirmed this outfall is not currently in use and is not expected to be used in the future.

Groundwater Features

11.6.12. The main characteristics of the geology (superficial and bedrock) that underlies the Proposed Scheme are described in **Section 17.6** of **Chapter 17: Ground Conditions and Soils (Volume 1)** and **Appendix 17-1: Preliminary Risk Assessment (Volume 3)** which consider both published information and the findings of previous ground investigations.

11.6.13. Additional information regarding the groundwater features baseline is available in **Appendix 11-3: Groundwater Impact Assessment (Volume 3)**.

11.6.14. Superficial deposits comprising Alluvium and the Taplow Gravel Member are low productivity aquifers with limited or local potential, where borehole yields are expected to be small. Localised areas of peat deposits are also present to the north of the Site at Riverside 2.

11.6.15. The Environment Agency classifies the Alluvium as a Secondary (undifferentiated) aquifer that is assigned in cases where it has not been possible to attribute either a category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both a minor and non-aquifer in different locations due to the variable characteristics of the rock type. The Taplow Gravel Member is designated a Secondary A aquifer. These are aquifers that support water supplies at a local rather than strategic scale and in some cases, form important source of base flow to rivers. The GI (1992, 2003, 2006, 2007, 2017 and 2021) at the Site has confirmed that these deposits directly underlie, or are present at shallow depth, within the Groundwater Study Area.

11.6.16. The Harwich Formation (specifically the Blackheath Member), Lambeth Group and Thanet Formation bedrock aquifers are designated by the Environment Agency as Secondary A aquifers. The London Clay Formation is classified Unproductive strata and the Chalk Group, that underlies the Site at depth, is classified a Principal aquifer. Principal aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

11.6.17. The GI (1992, 2003, 2006, 2007, 2017 and 2021) have confirmed that the London Clay Formation, Harwich Formation, Lambeth Group and Thanet Formation underlies the Site and are present within the Study Area. The average thickness of superficial and bedrock geologies is summarised in **Table 11-11** below (and **Chapter 17: Ground Conditions and Soils (Volume 1)**). The Chalk Group was not encountered during the GI (historical and subsequent) and is assumed to be present at depth >50m.

11.6.18. The Groundwater Vulnerability Map[41] shows the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a single square kilometre. A Medium to High groundwater vulnerability is designated to the majority of the Site and a Medium to Low groundwater vulnerability assigned to the northern part of the Site (at Riverside 2 and on the banks of the River Thames). The potential for contaminated soil to be present within the Site is detailed in **Chapter 17: Ground Conditions and Soils (Volume 1)**. The Site is not located within a Nitrate Vulnerable Zone.

Table 11-11: Summary of Geological Strata Encountered on Site During the GI (previous)

Stratum		Description	Thickness [a] (m)	Aquifer Designation
Artificial	Made Ground	A combination of artificial ground comprising man-made materials (i.e., tarmac, cement. Ash and brick).	1.5	No designation
Superficial	Alluvium	Soft to firm compressible silty clay with layers of silt, sand, peat and basal gravels.	6.2	Secondary Undifferentiated
	Taplow Gravel Member	Variable lithology of mainly gravel, silt and clay.	7.9	Secondary A
Bedrock	London Clay Formation	Poorly laminated silty to very silty clay, clayey silt and sandy clay. Thin beds or pockets of shells and fine sands are recorded.	6.8	Unproductive
	Harwich Formation (Blackheath Member)	Dominated by black and well-rounded flint gravel in a matrix of sand, with lenses of sand and thin clay layers. May be encountered at the base of the London Clay Formation.	7.8	Secondary A
	Lambeth Group	Sequence of silty or sandy clays with some sands and gravels interbedded.	7.6	Secondary A

Stratum		Description	Thickness [a] (m)	Aquifer Designation
	Thanet Formation	Typically composed of homogenous, bioturbated, glauconitic silty fine-grained sand, with sandy silt, silt or sandy, silty clay. Rare coarse gravel is present in places in London.	15 – 30[a]	Secondary A
	Chalk Group	White Chalk (microporous coccolithic limestone) with beds of flint, nodular chalks, hard grounds and marl seams.	100+[b]	Principal

Notes:

[a] Average thickness of strata provided considering all available GI data for the Site.

[b] expected thickness where unit has not been fully intercepted during GI and/or local BGS borehole logs. The expected thickness of the Chalk Group is referenced from BGS GeoIndex[42] and BGS Map Sheet 257 and 271[43].

Groundwater Levels and Flow

11.6.19. The source of local groundwater recharge to the superficial deposits is predominantly from rainfall and artificial sources i.e. land drains/ditches and existing site drainage infiltrating to ground. Groundwater flow within the Alluvium and Taplow Gravel Member is primarily intergranular where gravel and/or sandy strata is present.

11.6.20. The Harwich Formation, Lambeth Group and Thanet Formation can be considered a single groundwater unit (known as the basal sands) and is often in hydraulic continuity with the underlying Chalk aquifer. The permeability type is intergranular and through fractures depending on the degree of cementation. Recharge to these deposits may also occur through vertical migration within the superficial deposits.

11.6.21. The Chalk Group aquifer is an extensive Principal aquifer that receives recharge from multiple sources within the wider catchment. Regional groundwater flow is likely to occur in the deep bedrock aquifer.

11.6.22. Locally, groundwater flow is expected to the north of the site towards the River Thames however, variations in groundwater flow are expected due to the presence of drains and watercourses surrounding the Site, as well as the tidal influence of the River Thames. The Preliminary Risk Assessment (**Appendix 17-1: Preliminary Risk Assessment (Volume 3)**) recorded variable local groundwater flow conditions within the Alluvium and Taplow Gravel Member. As part of the Preliminary Risk Assessment, monitoring within the Taplow Gravel Member identified a tidal influence from the River Thames where a 2.5m difference was noted over a full tidal cycle. Groundwater flow direction was noted to be towards the River Thames to the north at high tide and north-west during low tide (**Appendix 17-1: Preliminary Risk Assessment (Volume 3)**).

11.6.23. A dewatering borehole for the construction of Riverside 2 to the north of the Site at NGR TQ 49416 80774 under licence number TH/039/0044/030 **(Appendix 17-1: Preliminary Risk Assessment (Volume 3)**) is (at the time of writing this Environmental Statement (ES) targeting underground strata comprising sand and gravel within the superficial deposit aquifers **(Paragraph 11.6.31)**. The dewatering borehole will affect groundwater level and flow (locally) however the radius of influence from the point of abstraction is unknown and no recent (2021 – 2023) groundwater level monitoring data are available for the Site.

11.6.24. Previous GI is available for the Site. The 2017 WSP Ground Investigation Report[44] and 2021 Doran Consulting Geotechnical Interpretative Report & Contaminated Land Report[45] GI is considered most appropriate to inform the baseline and is further complemented by freely available online data sources[41, 42, 43] where gaps in site specific baseline data exist.

11.6.25. There is limited groundwater level monitoring data available for the Site from the previous GI. Discontinuous groundwater level monitoring data are available from the subsequent (2017 and 2021) GI within the superficial deposits (Alluvium and Taplow Gravel Member). Water strikes were also recorded throughout the GI but only the discontinuous groundwater level monitoring data is considered most representative spatially and temporally and is summarised in **Table 11-12** and **Table 11-13**. **Figure 17-2: Previous Ground Investigations (Volume 2)** shows the location of previous ground investigations undertaken.

11.6.26. Groundwater observations found water levels to be variable across the Site for the superficial deposits (**Table 11-12** and **Table 11-13**). The average depth to groundwater level from the GI is 1.4m bgl (meters below ground level) for the Site. Shallow groundwater levels are recorded at 1.26m OD (meters Ordnance Datum) (0.55m bgl) at BH05[45] and the deepest groundwater level recorded at -0.86m OD (2.21 m bgl) at BH101D[44] for the Taplow Gravel Member. The variable groundwater levels recorded across the Site are indicative of hydraulic continuity within the superficial deposits as well as tidal influence from the River Thames and the presence of drains and watercourses surrounding the Site.

11.6.27. The water strikes recorded during borehole development[44,45] identifies areas on Site where potentially separate deeper bedrock groundwater levels exist. Water strikes are recorded at approximately -17.6m OD (20m bgl) at BH01 – BH08[44] for the Harwich Formation and up to -30.55m OD (32m bgl) at BH13[44] for the Lambeth Group. There is evidence of hydraulic connectivity existing between the bedrock and superficial deposits where a second deeper water strike recorded in BH04 -16.79m OD (18.6mbgl Harwich Formation) rose to -1.88m OD (3.69m bgl) after 20 minutes. Hydraulic connectivity with the overlying superficial deposits also occurred in BH02, BH03 and BH06[44] for the Harwich Formation (see **Table 2-3** in **Appendix 11-3: Groundwater Impact Assessment (Volume 3)**).

11.6.28. In general, groundwater levels are generally shallow relative to the ground surface across the Site (**Table 11-12** and **Table 11-13** below). Based on the data and information provided, the superficial and bedrock aquifers are considered potentially susceptible to possible factors which may affect their quantity regimes from near surface influences.

Table 11-12: Summary of Discontinuous Groundwater Level Records from March 2017

Exploratory Hole/Elevation (m OD)[a]	Response Zone	Groundwater Elevation (m OD)			Groundwater Level (m bgl)		
		Min	Mean	Max	Min	Mean	Max
BH101S (1.344)	Made Ground	-0.09	0.02	0.10	1.25	1.60	1.43
BH101D	Taplow Gravel Member	-0.86	-0.47	0.00	1.34	1.80	2.21
BH102S (1.338)	Alluvium	-0.59	-0.16	0.64	0.7	1.50	1.93
BH102D	Taplow Gravel Member	-0.63	-0.28	0.39	0.95	1.60	2.08
BH103S (1.309)	Alluvium	-1.32	-1.06	-0.61	1.92	2.40	2.63
BH103D	Taplow Gravel Member	-0.77	-0.38	-0.04	1.35	1.70	2.08

Note:
[a] shallow and deep monitoring installations denoted by (S) and (D) respectively.

Table 11-13: Summary of Discontinuous Groundwater Level Records from April 2018 and October 2019

Exploratory Hole/ Elevation (m OD)	Response Zone	Groundwater Elevation (m AOD)			Groundwater Level (m bgl)		
		Min	Mean	Max	Min	Mean	Max
BH01 (3.02)	Alluvium	-0.39	0.00	0.36	2.66	3.02	3.41
BH02 (2.44)	Alluvium	0.87	1.10	1.58	0.82	1.30	1.53
BH03 (3.40)	Alluvium	0.98	1.03	1.12	2.28	2.37	2.42
BH04 (1.81)	Made Ground/ Alluvium	0.08	0.44	0.69	1.12	1.37	1.73
BH05 (1.81)	Taplow Gravel Member	-1.44	-0.47	1.26	0.55	2.28	3.25
BH08 (1.32)	Taplow Gravel Member	-0.86	-0.10	0.73	0.59	1.42	2.18
BH09 (1.70)	Made Ground/ Alluvium	0.78	0.86	0.97	0.73	0.84	0.92
BH11 (1.28)	Alluvium	0.6	0.64	0.78	0.50	0.64	0.68
BH12 (1.04)	Taplow Gravel Member	-0.83	-0.15	0.42	0.62	1.19	1.87
BH13 (1.45)	Alluvium	0.66	0.94	1.19	0.26	0.51	0.79

Aquifer Permeability

11.6.29. Based on the geological description, most of the ground underlying the Site is characterised by low permeability superficial deposits (Alluvium and Taplow Gravel Member). In-situ permeability tests i.e. variable head tests have been completed for two borehole locations where standpipes are installed (BH02 and BH10[45]).

11.6.30. Five variable head tests were completed at BH02 and BH10. BH02 completed variable head tests in gravelly clay strata (relating to the Alluvium Deposits) and a test completed within gravelly silty coarse sand (relating to the Taplow Gravel Member). An average hydraulic conductivity for the Alluvium Deposits is recorded at 2.2E-04m/s and a hydraulic conductivity for the Taplow Gravel Member recorded at 1.99E-05m/s. BH10 completed variable head tests in clay strata and no record of hydraulic conductivity (K value) was calculated[45].

11.6.31. No in-situ permeability testing was completed in the bedrock geologies as part of the previous GI.

Groundwater Abstractions

11.6.32. **Table 11-14** shows groundwater abstraction licence(s) data received from the Environment Agency and GroundSure Reports (see **Appendix 17-1: Preliminary Risk Assessment (Volume 3)**) within the Study Area. This table does not include abstractions outside of the Groundwater Study Area or north of the River Thames where no direct/indirect impact is expected on these receptors, as the River Thames forms a barrier to groundwater impacts being conveyed upgradient.

11.6.33. The dewatering borehole for the construction of Riverside 2 (**Paragraph 11.6.23** and **Table 11-14**) is located within the Site targeting underground strata comprising sand and gravels of the superficial deposits. The period of abstraction is between March 2023 and January 2025. The maximum quantity of water abstracted cannot exceed 320 litres per second. The water abstracted under the current licence is discharged to the Thames Middle Transitional WFD Water Body at NGR TQ 49670 80879 and /or TQ 49579 80771 (Discharge 1 and Discharge 2 respectively). Under cessation of the dewatering licence (January 2025) it is expected that groundwater levels (locally) are anticipated to rebound/recover to pre-construction groundwater levels within the superficial sand and gravel deposits, potentially similar to groundwater levels recorded in the subsequent GI (2017 and 2021).

11.6.34. The Applicant is aware of Crossness LNR using water windmill pumps to abstract water to enhance the habitat to the west of Great Breach Dyke. No other records of small private (non-licenced) water supplies are identified within the Groundwater Study Area. Furthermore, considering the nature of the environment (industrial/ commercial), small private (non-licenced) supplies are not expected to be present.

Table 11-14: Abstraction Licences within Groundwater Study Area

Abstraction Licence No/ Name	Easting	Northing	Purpose	Target Aquifer	Location
TH/039/044/030 **Riverside Energy Park**	549416	180774	Dewatering	Sands and gravels	Within Site
TH/039/044/012 **Tarmac Trading Ltd**	550733	179679	Mineral Washing	Unknown	Within Study Area - 1km east of Site
28/39/44/0032 **United Marine Aggregates Ltd[a]**	550780	179700	Mineral Washing	Unknown	Within Study Area – 1km east of Site
28/39/44/0048 **Tarmac Ltd[a]**	550780	179700	Mineral Washing	Unknown	Within Study Area – 1km east of Site
Note: [a] Historical licence and considered inactive based on information provided from Environment Agency.					

Groundwater Quality

11.6.35. A summary of groundwater quality is provided in **Appendix 17-1: Preliminary Risk Assessment (Volume 3)** and **Chapter 17: Ground Conditions and Soils (Volume 1)**. Previous ground investigations have identified contaminants of concern in groundwater on the Site. The land use of the Site has remained relatively unchanged with the historical and subsequent GI confirming the presence of heavy metals and olfactory. The groundwater quality of the Made Ground, Alluvium and Taplow Gravel Member found elevated concentrations of salt within shallow groundwater which suggests saline intrusion from the River Thames to these deposits[44].

11.6.36. A controlled waters risk assessment[44] considered that contamination within the shallow groundwater posed a low and very low risk to the River Thames, groundwater and surrounding surface water receptors.

11.6.37. No additional groundwater quality data has been provided through consultation and engagement on the Proposed Scheme to date. Additional groundwater monitoring and sampling will be undertaken as part of the construction phase ground investigation proposed to inform the detailed design (**Chapter 17: Ground Conditions and Soils (Volume 1)**) as part of the **Outline CoCP (Document Reference 7.4)**.

WFD Designated Water Bodies

11.6.38. There is one WFD designated surface water body located within the Study Area, the Thames Middle Transitional WFD Water Body (GB530603911402). This is a transitional water body that is heavily modified. The Thames Middle Transitional WFD Water Body is designated for its biological, physicochemical and hydromorphological quality elements. The area of the Site within the River Thames is located within the London Management Catchment but outside of any designated Operational WFD Catchment.

11.6.39. The Proposed Scheme overlays the Greenwich Tertiaries and Chalk Water Body (GB40602G602500)[37]. This is currently graded with Poor Overall Status (2019 Cycle 3) due to groundwater abstraction activities (water industry and industry) and the impact from saline intrusion. The groundwater body is protected under the Drinking Water Directive. The long term objective is to achieve a 'Good' chemical condition by 2027; however, there is no stated plan to similarly elevate the quantitative condition (for further details refer to **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**).

11.6.40. The WFD water bodies are shown on **Figure 11-1: Water Environment Study Area (Volume 2)**.

Coastal Processes

11.6.41. The Coastal Processes Study Area covers the reach of the River Thames between Richmond and Coryton; this reach is tidally influenced. Adjacent to the Site, water levels range from approximately +3.6m AOD (Mean High Water Spring) to –2.4m AOD (Mean Low Water Spring) with a total mean spring tidal range of approximately 6m. Tide levels can be higher during more extreme tidal events such as storm surges.

11.6.42. The River Thames seabed is highly mobile with high volumes of sediment transport occurring both on the ebb and flood tides. Typically, the dominant sediment type in this section of the River Thames is soft alluvium muds.

11.6.43. Further information regarding the coastal processes baseline is available in **Appendix 11-4: Coastal Modelling Studies (Volume 3)**.

Flood Risk

11.6.44. The Environment Agency's Flood Map for Planning[33] shows the flood risk associated with the Site. The map indicates that the Site is located within Flood Zone 3, within

the undefended tidal flood extent of the 1 in 200 year event (0.5% Annual Probability of Exceedance (AEP))., This map excludes the presence of flood defences. However, there are significant flood defences located along the River Thames. These are maintained by the Flood Defence Owner (normally the adjacent landowner) under the supervision of the Environment Agency. The Environment Agency undertakes frequent inspections to ensure appropriate maintenance is being carried out and that crest levels are suitably set to achieve the required Standard of Protection (1 in 1000 year event present day). These defences are adjacent to and partly within the Site. These defences provide the Site with a reduction in flood risk, as shown by the Environment Agency's Reduction in Risk of Flooding from Rivers and Sea due to Defences dataset. The Flood Zones and the reduction in risk areas are shown in **Figure 11-3: Flood Zones (Volume 2)**.

11.6.45. Whilst the defences protect the Site from tidal and fluvial flooding from the River Thames, it remains at residual risk of flooding from overtopping or a breach of the defences. The Environment Agency has completed modelling through the Thames Estuary Breach Assessment[52] and the Marsh Dykes Model[53] to assess the potential implications of a breach of the defences. These models have been used and developed further to inform **Appendix 11-2: Flood Risk Assessment (Volume 3)** and the development of embedded and additional mitigation.

11.6.46. The Proposed Jetty is, by its nature, to be located within the channel of the River Thames, as such it will be at risk of fluvial/tidal flooding.

11.6.47. The Environment Agency's Risk of flooding from surface water map[34] as presented in **Figure 11-5: Surface Water Flood Risk Map (Volume 2)** shows the flood risk from surface water sources. It is understood that this mapping has not been updated with any local data since its publication in 2013 and therefore is based upon the Environment Agency's 2012 composite Digital Terrain Model (DTM) (i.e. LiDAR obtained by the Environment Agency up to April 2012[65]). Depending on the date it was collected this may not cover the as built ground levels for Riverside 1. The Environment Agency has subsequently undertaken hydraulic modelling of the Marsh Dykes using the Marsh Dykes Model[53], which assesses the fluvial and pluvial (surface water) risk of flooding to the Site. This modelling does not include the ground levels for Riverside 2 or the impacts of the surface water drainage strategies in place for both Riverside 1 and Riverside 2. **Appendix 11-2: Flood Risk Assessment (Volume 3)** presents a revised fluvial/pluvial flood extents for the Marsh Dykes that includes Riverside 1 and Riverside 2. This modelling demonstrates that there is limited flooding on the Site during the 1 in 100 year plus 40% climate change event.

11.6.48. The Environment Agency's Flood Risk from Reservoirs map shows that the Site is not within the maximum extent of flooding from reservoirs should a breach of a reservoir occur when downstream rivers are in normal flow conditions or flooding flow conditions. A further risk of flooding from artificial sources has been identified, this

being as the result of failure at Crossness Sewage Treatment Works, which is owned and managed by Thames Water. This is considered to be a residual risk.

Groundwater Flooding

11.6.49. The LBB Level 1 SFRA provides historical records of groundwater flooding from groundwater sources (**Appendix 11-3: Groundwater Impact Assessment (Volume 3)**) and provides low resolution mapping of areas susceptible to groundwater flooding which identifies the Site as Moderate risk.

11.6.50. Groundwater was recorded closest to the surface in BH13 (Alluvium) at 0.26m bgl (1.19m OD) and BH05 (Taplow Gravel Member) at 0.55m bgl (1.26m OD) in September 2019 and April 2018 respectively (**Appendix 11-3: Groundwater Impact Assessment (Volume 3)**). On average, and accounting for all discontinuous monitoring data, the average depth to groundwater within the Site is 1.49m bgl (0.43m OD) for the superficial deposits.

11.6.51. Based on the underlying geological conditions, there is potential for groundwater flooding to locally be an issue during construction where groundwater levels are relatively close to the ground surface and construction would involve excavation i.e. sheet pile wall installation.

11.6.52. More information regarding the baseline flood risk is available in **Appendix 11-2: Flood Risk Assessment (Volume 1)**.

Potable Water Supply

11.6.53. The London Water Resource Zone is classified as High Water Deficit and is currently forecast to have a significant supply-demand balance challenge by the early 2030s, which grows to very large volumes in the future. By 2050 the London Water Resource Zone's supply-demand balance challenges range from a deficit of around 360Ml/d to a deficit of nearly 890Ml/d.

Drainage Infrastructure

11.6.54. A Drainage Strategy is in place for Riverside 1 and a Drainage Strategy[66] will also be implemented through the construction of Riverside 2. These discharge into surface water features and ditches adjacent to Norman Road (see **Paragraph 11.6.1** to **11.6.11** for details), which also receive surface water runoff from the surrounding area.

FUTURE BASELINE

Riverside 2

11.6.55. The future baseline for the Proposed Scheme will include the operation of Riverside 2 (which is due to be operational in 2026). As a result of the operation of Riverside 2, the future baseline is unlikely to change from that of the baseline in relation to the

WFD and coastal processes. However, it is considered that Riverside 2 is likely to change the baseline in relation to:

- surface water features;
- groundwater; and
- flood risk.

11.6.56. A summary of each of the likely changes is provided below.

Surface Water Features

11.6.57. Riverside 2 incorporates mitigation measures (as detailed within Chapter 12: Hydrology Flood Risk and Water Resources of the Riverside 2 ES[67] and the associated Surface and Foul Water Drainage Strategy[66]) to ensure that there are no significant effects on surface water features within or adjacent to Riverside 2, once it is operational.

Groundwater

11.6.58. Under cessation of the dewatering licence at Riverside 2 (January 2025) it is expected that groundwater levels (locally) are anticipated to rebound/recover to pre-construction groundwater levels within the superficial sand and gravel deposits over time and potentially to levels similar to groundwater levels recorded in the previous GI.

Flood Risk

11.6.59. Riverside 2 incorporates mitigation measures (as detailed within Chapter 12: Hydrology Flood Risk and Water Resources of the Riverside 2 ES[49], Flood Risk Assessment[68] and Surface and Foul Water Drainage Design Strategy[65,66]) to ensure that there are no significant effects on flood risk. The surface water drainage strategy of Riverside 2 and the vulnerability classification of the development is taken in account within this assessment.

Other Changes

11.6.60. The effects of climate change may impact the future baseline, along with human interventions. The magnitude of these is considered below.

Surface Water Features

11.6.61. As part of the site visit on the 29th of November 2023, observations were made of the ordinary watercourses in and immediately adjacent to the Site, particularly in relation to the flow conveyance capability and vegetation growth. These observations infer that there is limited maintenance being undertaken of these surface water features, thus in the future their flood flow conveyance capacity could be reduced.

11.6.62. It is understood that the Environment Agency has a requirement to upgrade the Great Breach Pumping Station by 2036, the details of which are yet to be confirmed, although it is understood that this is unlikely to involve restoration of the gravity outfall.

It is therefore expected that the pumping station will be able to keep up with the impacts of climate change.

Groundwater Features

11.6.63. The effects of climate change may impact on groundwater levels (locally) within the Study Area due to hydraulic connectivity to surface water, changes to precipitation patterns and groundwater recharge. The combined climate change effects may lead to greater interaction between surface waters and groundwater in the future. Therefore, allowances have been included in the design to account for these future changes to the water environment to improve the sustainability and future-proof the Proposed Scheme as detailed in **Appendix 11-2: Flood Risk Assessment (Volume 3)**.

11.6.64. The overall effect on the natural groundwater regime (quantity and quality) from climate change is unpredictable due to various climate change factors directly influencing associated resources in opposing ways; high temperatures reducing groundwater recharge, changes to rainfall patterns altering the seasonality and long term groundwater recharge and enhanced extremes increasing regime variability. The groundwater regime may be further impacted indirectly by climate change due to associated changes in anthropogenic behaviour affecting land use and water resource development/management.

11.6.65. Overall, a marginal increase in groundwater resource due to climate change is expected but occasionally increased stresses on groundwater resources, due to drought severity being exacerbated by climate change and corresponding demands on water resources increasing at times of drought, are expected.

11.6.66. The groundwater water body Greenwich Tertiaries and Chalk Water Body which currently holds ‘Poor’ quantitative and chemical status, will be assessed as future ‘Good’ status. The Environment Agency expects the groundwater water body to achieve ‘Good’ chemical status by 2027 but there is no stated plan to similarly elevate the ‘Quantitative Condition’. Any potential change in status would not affect the importance of the receptor which remains a regionally important aquifer irrespective of designation.

WFD Designated Water Bodies

11.6.67. No changes to the future baseline are expected in relation to the WFD baseline conditions. It is assumed that the mitigation measures outlined in the Thames RBMP to enable the achievement of the objectives of the RBMP which are not likely to change the current status and baseline assessed in **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**.

Coastal Processes

11.6.68. Increases in sea level as result of climate change could impact the coastal processes across the Coastal Processes Study Area. This would likely be a uniform increase in

both the high and low tide levels, thus no adverse change in the modelled coastal processes would be expected. However, the potential sea level increases could result in a greater depth of water in the River Thames across the Study Area, which could potentially result in a greater cross-sectional area and thus lower peak flow velocities and thus lower bed shear stresses, when compared to the modelled baseline scenario (i.e. the model is a conservative worst case scenario).

Flood Risk

11.6.69. As a result of climate change the future baseline is anticipated to be subject to increased frequency and increased depths of fluvial, surface water and tidal flooding unless managed by existing and improved infrastructure.

11.6.70. Fluvial, surface water and tidal flood risk is expected to increase as a consequence of climate change which is predicted to result in increased sea levels, greater tide locking, higher peak fluvial flows, and more intense rainfall events. Pertinent information from the Environment Agency's Flood Risk Assessments Climate Change Allowances[69] is presented in **Table 11-15** and **Table 11-16.** The tables show the predicted increase in peak river flow and peak rainfall allowances for a range of epochs and scenarios to be considered as part of the detailed design.

Table 11-15: London Management Catchment Peak River Flow Allowances

Epoch	Central (%)	Higher (%)	Upper (%)
2020s	10	14	26
2050s	7	14	30
2080s	17	27	54

Table 11-16: London Management Catchment Peak Rainfall Allowances

Period	Central (%)	Upper end (%)
2070s	24	40

11.6.0. The Environment Agency has developed the Thames Estuary 2100 Plan[70] which details what will need to be implemented to protect the whole estuary from climate change. Table 7.1 of the Thames Estuary 2100 Plan[70] outlines that the River Thames defences adjacent to the Site could need increasing from the current defence height to 8.2m AOD by 2120. Although for the period 2070 to 2120 (the period in which the design life of the Proposed Scheme falls) the maximum height is 7.70m AOD. The maximum height is dictated by the mitigation measures adopted elsewhere in the estuary. Climate change over the design life of the Proposed Scheme has been taken

into consideration in **Appendix 11-2: Flood Risk Assessment (Volume 3)** and the design of the Proposed Scheme.

11.6.1. In accordance with the NPPF[2], no future changes are expected to the surface water drainage strategies for Riverside 1, Riverside 2 or adjacent sites which would adversely impact the future baseline.

Potable Water

11.6.2. The Thames Water Resource Management Plan (Draft)[64] covers the period from 2025 to 2075 and indicates that implementation of the twin-track approach combining demand management with resource development, will resolve the supply-demand deficit in all years of the planning period for the London Water Resource Zone.

11.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

11.7.1. The **Design Principles and Design Code (Document Reference 5.7)** are commitments which will govern the design of the Proposed Scheme during the detailed design stage. The **Design Principles and Design Code (Document Reference 5.7)** are considered to be embedded mitigation for the purposes of the assessment presented in this chapter.

CONSTRUCTION PHASE

11.7.2. This section sets out the embedded design, mitigation and enhancement measures relevant to the water environment and flood risk assessment during the construction phase of the Proposed Scheme. The mitigation measures included within this section are set out in the **Outline CoCP (Document Reference 7.4)**, unless otherwise stated, and will be secured by requirement of the DCO requiring production of the full CoCP(s) in substantial accordance with the outline. The **Outline CoCP (Document Reference 7.4)** sets out:

- That construction activities will be undertaken in accordance with appropriate good practice guidance, such as the Construction Industry Research and Information Association's (CIRIA) control of water pollution from construction sites[71] (C532) and the Environment Agency's Pollution Prevention for Businesses[28]. Also, Guidance for Pollution Prevention (GPP)[27] which provide good practice guidance, particularly PPG1 - General guide to the prevention of water pollution; GPP 2 - Above ground oil storage tanks; GPP 5 - Works and maintenance in or near water; and GPP 6 - Working at construction and demolition sites.
- That the full CoCP(s) will contain work instructions for onsite staff that will inform them of the legal obligation to protect the water environment from contamination and the way that they should work onsite to reduce the risk of polluting the surrounding environment. It will include instructions on dealing with certain

situations such as general good site practice, adverse weather conditions, environmental incidents, and complaints.

- Details of equipping construction staff with the necessary equipment, Personal Protective Equipment (PPE) and substances to implement biosecurity control measures, including effective hygiene and sanitation practices.
- The requirement for inspections and audits along with general monitoring and reporting of the effectiveness of control measures. The mitigation strategies implemented would be reviewed regularly to best suit the practices currently being undertaken onsite.
- That prior to any works being undertaken near a watercourse, a pollution prevention plan will be prepared alongside the full CoCP(s). This will include a description of the procedures that will be followed in the event of an environmental emergency such as a fuel or chemical spillage onsite. This will enable the Contractor(s) and other bodies (e.g. the Environment Agency) to rapidly manage and mitigate a pollution event should one occur during construction or operation of the Proposed Scheme. This will detail:
  - the locations, names and references of the watercourses as shown in **Figure 11-6: Pollution Prevention Plan (Volume 2)**;
  - normal flow directions;
  - key culverts/barriers to flow;
  - inspection locations;
  - access points;
  - locations of pollution prevention measures (e.g. spill kits, silt curtains, silt traps, booms and stop boards) both embedded and reactive;
  - outfalls/connections to other watercourses (including the River Thames);
  - a contingency plan in case of an accident/pollution incident;
  - a definition of a major pollution incident;
  - methodology, to be agreed with the LLFA/Environment Agency, to shut down the Great Breach and/or Green Lake Pumping Stations; and
  - that the Watercourse Pollution Prevention Plan will be reviewed and revised as necessary during construction if environmental conditions change (for example excessive wet weather).

11.7.3. **Figure 17-3: Connections between Ground Conditions Mitigations Tasks and Design** in **Chapter 17: Ground Conditions and Soils (Volume 1)** diagrammatically shows the measures undertaken throughout the ground conditions and soils assessment in the context of the design of the Proposed Scheme. This is also applicable to the water environment where ground condition information will be obtained from the ground investigation that will be undertaken prior to construction as secured by DCO requirement within the **Draft DCO (Document Reference 3.1)** and set out in the **Outline CoCP (Document Reference 7.4)**.

Surface Water Features

Increased Sediment Load

11.7.4. The following measures will be implemented during construction of the Proposed Scheme to avoid and reduce the potential impacts to the sensitive receptors from increased sediment loads:

- Soil and stockpiles will not be located within 10m of surface waterbodies or drainage lines without appropriate cut off features or flow barriers.
- Stockpiles will be appropriately managed e. g. by using jute matting to mitigate release of sediment load.
- Topsoil will not be stored in the parts of the Temporary Construction Compounds (as shown on the **Works Plans (Document Reference 2.3)**) which are shown to be at risk of flooding from the Marsh Dykes (shown in **Figure 11-4: Marsh Dykes Breach Model Results (Volume 2)**).
- No activities would take place in the Marsh Dykes (ordinary watercourses) with the exception of infilling activities and construction of drainage outfalls, as discussed below.
- No activities would take place in the River Thames or within 16m of the toe of the flood defences without prior consent from the Environment Agency. It is proposed that consent for these activities will be sought through the DCO (via the Environment Agency's Protective Provisions), and as such that no separate Flood Risk Activity Permit will be required.
- A construction phase surface water management plan would be prepared as part of the full CoCP(s) to ensure that the runoff (in terms of both quality and quantity) is appropriately managed, so it does not increase risk of pollution to the environment.
- All loose materials will be covered.
- Construction activities including vegetation clearance, earth moving, storage of materials and equipment and plant movement in the vicinity of any surface water feature or drainage lines will be minimised.
- Land clearance in the vicinity of surface water features will be minimised. When land clearance in the vicinity of surface water features is unavoidable, the features would be protected with, but not limited to, silt traps, silt fences and filter bunds.
- Temporary cut-off drains will be used around the perimeter of the working areas to prevent clean runoff entering and dirty water leaving the working area without appropriate treatment.
- Vegetation will only be removed when necessary and gradients kept as shallow as possible to prevent large amounts of earth being washed away during periods of heavy rainfall.
- Areas of ground that have been exposed will be reseeded or surfaced as soon as reasonably practicable.

- Facilities will be provided for wheel washing to prevent “track out” from vehicles. Wheel wash facilities will be appropriately contained to ensure that silt laden water would not reach surface water features.
- Surface water run-off and excavation dewatering will be captured and settled out prior to water being discharged to the Marsh Dykes or Norman Road Stream. Runoff from potentially highly contaminated areas will be treated appropriately prior to discharge. The Contractor(s) will apply for construction discharge permits if required, and the process for this is detailed in the **Outline CoCP (Document Reference 7.4)**.
- Cut off ditches, silt fencing or similar measures, will be provided along the perimeter of the Site to capture any runoff from the Site.
- Measures to protect drains and surface water features from increased sediment load will be implemented, for example, by labelling/marking drains or using silt traps.
- All the existing drains and sewers within the Site will be identified and labelled and measures implemented to prevent polluting substances from entering them.

Release of Hydrocarbons and Oils and Use of Hazardous Materials

11.7.5. The following measures will be implemented during construction of the Proposed Scheme to avoid and reduce the potential impacts to the sensitive receptors from the release of hydrocarbons and oils and the use of hazardous materials:

- A construction phase surface water management plan would be prepared as part of the full CoCP(s) to ensure that the runoff is appropriately managed, so it does not increase risk of pollution to the environment.
- Appropriate interceptors will be incorporated in the onsite drainage systems.
- Spill containment equipment will be stored on the Site.
- Hazardous substances, oil and fuel will not be located within 10m of water bodies or drainage lines and will be stored in bunded areas holding at least 110% of the container or one quarter of the combined capacity of all containers where there are more than one. Storage and bunded areas will be constructed with impervious floors.
- Refuelling of machinery will be undertaken in bunded areas, which will not be located within 10m of water bodies or drainage lines.
- All refuelling will be supervised and carried out in a designated area with appropriate cut-off drainage and located away from watercourses and drainage lines.
- Drip trays will be used for diesel pumps and standing plant will be regularly maintained to prevent leaks.
- Construction materials, such as cement, will be mixed in designated areas located away from water bodies and drainage lines.
- Concrete wash out will only take place at designated concrete washout areas.

Infilling of Water Features

11.7.6. The infilling of water features that is required during the construction phase can be undertaken in such a manner so as to prevent an increase in silt/sediment loads in the receiving watercourses/Marsh Dykes and, with appropriate mitigation in place as set out above, to prevent the creation of contaminant pathways to the receiving groundwater body and/or any increase in groundwater flood risk to the new infrastructure.

11.7.7. The loss of water features will be offset by the enhancement/creation of new water features through the measures discussed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, **Chapter 7: Terrestrial Biodiversity (Volume 1)**, the **Outline Drainage Strategy (Document Reference 7.2)** and the **Outline LaBARDS (Document Reference 7.9)**.

Moving of Water Features

11.7.8. Sections of OW4 and the northern section of OW3 will be moved in order to accommodate the Flue Gas Supply Ductwork. Details regarding the moving of water features is in the **Outline Drainage Strategy (Document Reference 7.2)**. The construction of the new watercourse will be undertaken in the dry and measures to deal with the first flush through the new watercourses, as set out in the **Outline CoCP (Document Reference 7.4)**.

11.7.9. The new watercourses provide the opportunity for a betterment in comparison to the existing watercourses as they were observed to be vegetated during the general site walkover. The new watercourses would be designed to replicate the size of the existing watercourses. The design of the new watercourses would be undertaken during detailed design and in consultation with the LLFA.

11.7.10. Norman Road Stream may require diversion or protective measures due to the location of the platform. This will be developed during detailed design and in consultation with the Environment Agency.

Dust and Debris

11.7.11. Dust management procedures would be applied as detailed in **Chapter 5: Air Quality (Volume 1)**.

Groundwater Features

11.7.12. The **Outline CoCP (Document Reference 7.4)** details measures in accordance with the Environment Agency's Approach to Groundwater Protection Guidance[72]. Specifically, Section C Infrastructure, Section D Pollutant Storage and Transmission, Section G Discharge of liquid effluents in to the ground, Section J Land Contamination, Section N Groundwater resources and Section S Flooding from Groundwater, details the measures associated with construction activities.

11.7.13. Ground investigation would be undertaken prior to the construction phase as secured by DCO requirement within the **Draft DCO (Document Reference 3.1)** and set out in the **Outline CoCP (Document Reference 7.4).** As shown in **Figure 17-3: Connections between the Ground Conditions and Soils Mitigation Tasks and design** of **Chapter 17: Ground Conditions and Soils (Volume 1)**, this is likely to be led by geotechnical requirements but would include geo-environmental sampling of terrestrial soils, marine sediments, groundwater and surface water. The scope of the geo-environmental investigation would be underpinned by the CSM presented in **Appendix 17-1: Preliminary Risk Assessment (Volume 3)**. Depending on the information gathered through this ground investigation, monitoring of groundwater and surface water may be recommended before construction commences, during construction works and post-construction.

11.7.14. The **Outline CoCP (Document Reference 7.4)** requires that a Piling Risk Assessment would be produced to outline measures to protect the underlying aquifers during construction phase activities (i.e. drilling, piling, excavation and dredging), and to mitigate the risk of creating preferential pathways for potential contamination to the aquifers **(Section 17.8** of **Chapter 17: Ground Conditions and Soils (Volume 1)**). Additionally, risk assessments will be undertaken for any construction proposals entailing significant groundworks (especially those which are proposed to include excavations and below ground structures likely to penetrate below the groundwater table) including a Generic Quantitative Risk Assessment (GQRA) to allow assessment of identified plausible contaminant linkages and remedial measures as required (**Appendix 17-1: Preliminary Risk Assessment (Volume 3)**).

WFD Designated Water Bodies

11.7.15. **Appendix 11-1: Water Framework Directive Assessment (Volume 3)** provides a full description of the WFD related mitigation measures embedded in the Proposed Scheme. These are summarised as follows:

- The capital/construction phase dredging works will be undertaken by a backhoe dredger. Backhoe dredging utilises an excavator mounted on the edge of a pontoon or barge, which reaches into the water and scoops bed material out. A separate vessel or barge will be moored alongside, which the dredged material is deposited directly into.
- A sheet pile wall will be installed (capped at bed level) within the river channel to prevent potential erosion of intertidal sediment and reduce the size of the dredge pocket required.
- The dredged arisings will be managed in accordance with relevant legislation and will be disposed of offsite (via vessel and only if dredged arisings are deemed suitable for this disposal method and conform with the permits for disposal sites). The removal of the dredged arisings will be undertaken by an appropriately licenced waste carrier.

- Construction activities involving working on tidal/intertidal zones, such as sheet pile installation construction, should, where possible, occur during low tide conditions to ensure that structures are constructed within a dry working environment.
- Noise and vibration must be controlled and kept to the minimum necessary.
- Lighting used for construction must be switched-off when not in use and, where possible, positioned so as not to spill on to watercourses.
- Dredged material should not be disposed of offsite without proper treatment, as it provides a pathway for spreading marine INNS to other areas.
- It is expected that construction vessels will follow standard procedures for managing INNS in their ballast water. The **Outline CoCP (Document Reference 7.4)** includes a commitment that the full CoCP(s) will include a Biosecurity Management Plan.
- To mitigate preferential pathways to controlled waters (including WFD groundwater water bodies) that result from construction phase activities, a Piling Risk Assessment, Materials Management Plan, Earthworks Specification and/or Remediation Strategy (as appropriate) would be produced (further information is included in **Chapter 17: Ground Conditions and Soils (Volume 1)**).

Coastal Processes

11.7.16. **Appendix 11-4: Coastal Modelling Studies (Volume 3)** outlines the specific embedded mitigation measures relating to avoiding and reducing impacts to coastal processes, which include a sheet pile wall to the rear of the dredge pocket to help maintain the integrity of the adjacent side slopes (dredged or intertidal).

Flood Risk

11.7.17. The measures outlined below will be implemented during construction of the Proposed Scheme to reduce potential impacts to sensitive receptors associated with flood risk.

11.7.18. No works will be carried out within the Site Boundary when there is a risk of breach of the River Thames flood defences. Furthermore, should an event larger than the standard of protection event (1 in 1000 years) be forecast, then no works will be carried out within the Site Boundary.

11.7.19. The Contractor(s) will detail the procedures for securing the Site and plant equipment for a flood event (breach or overtopping of the River Thames Flood Defences), in particular with reference to safe working practises, harmful substances and fuels.

11.7.20. The Principal Contractor will sign up to the Environment Agency flood warning service (or equivalent at the time of construction) to receive up to date flood information and warnings.

11.7.21. The potential increase in flood risk associated within a loss of water features that currently provide stormwater storage will be offset through providing storage within the surface water management plan required by the **Outline CoCP (Document Reference 7.4)**.

OPERATION PHASE

11.7.22. This section sets out the embedded design, mitigation and enhancement measures relevant to the water environment and flood risk assessment during the operation phase of the Proposed Scheme.

11.7.23. In addition to the Operational EMP, the current environmental management system for Riverside 1 and 2, which is certified to ISO14001 (internationally recognized standard for environmental management systems), would be updated to incorporate any new procedures and update current procedures in order to control environmental impacts as a result of the operation of the Proposed Scheme. The mitigation measures included within this section are secured by their inclusion in the **Mitigation Schedule (Document Reference 7.8)** and the **Draft DCO (Document Reference 3.1)** requiring that the Operational EMP should include the relevant parts of the Mitigation Schedule, unless otherwise stated.

11.7.24. **Chapter 2: Project Scheme and Site Description (Volume 1)** provides a description of the water usage requirements for the Proposed Scheme and **Chapter 3: Consideration of Alternatives (Volume 1)** explains the justification for progressing with the selected options for water usage. This sets out the measures embedded into the design of the Proposed Scheme to minimise potable water use through the use of appropriate technologies and an innovative approach. Detailed design will manage potable water demand through implementation of all or some of the following measures:

- using dry cooling for CO_2 Processing;
- pre-cooling the incoming flue gas (for re-heating outlet flue gas and/or us in the Heat Recovery and Heat Transfer System;
- rainwater harvesting; and/or
- onsite storage.

Surface Water Features

General

11.7.25. The Proposed Scheme will include a system for mitigating the risk of potential pollution contamination to the Site and adjacent areas, including the Crossness LNR. This includes the water quality measures embedded in the **Outline Drainage Strategy (Document Reference 7.2)** (i.e. filter drains, ponds and oil separators/downstream defenders). The **Outline Drainage Strategy (Document Reference 7.2)** discharges into the Marsh Dykes ditch network before being pumped into the River Thames.

11.7.26. Any discharges from potentially high risk internal areas (e.g. those contained and bunded within the buildings) will be contained and tested prior to release to either the surface water network or, if polluted, discharged into the foul network. These areas are not considered as part of the proposed surface water pollution prevention measures, since they are unlikely to contribute to the surface water drainage pollution sources.

11.7.27. The following external areas within the Site have been identified and are included within the **Outline Drainage Strategy (Document Reference 7.2)** as requiring pollution prevention measures to collect and control potentially contaminated surface water runoff:

- Chemical Storage and Distribution Handling Facilities;
- Solvent Storage;
- Back Pressure Turbine and Generator;
- Liquefaction within the CO_2 Processing Plant(s);
- LCO_2 Buffer Storage Area; and
- Wastewater Treatment Plant.

11.7.28. The design of the Proposed Scheme will take into account the relevant regulations, standards, approved codes of practices, design codes and guidance applicable to the relevant systems. Environmental management systems will be put in place during the operation of the Carbon Capture Facility, in accordance with Environmental Permit requirements.

11.7.29. The Proposed Scheme is to be designed in accordance with Dangerous Substances and Explosive Atmospheres (DSEA) Regulations[73], HSG140 Safe use and handling of flammable liquids guidance[74], L5 Control of substances hazardous to health ACOP and guidance[75] and CIRIA's Design of containment systems for the prevention of water pollution from industrial incidents[76].

11.7.30. Appropriate design features will be incorporated within the Proposed Scheme at the detailed design stage, such as: containment measures and barriers to prevent damage to pipelines; pressure monitoring and pressure relief systems to prevent over pressurisation situations and leak detection systems; features to minimise, isolate or shut down systems in the event of an abnormal plant performance; isolation valves contained in the surface water drains and attenuation system to be closed in the event of accidental spillage into the uncontaminated surface water drainage system; and the inclusion of pollution prevention/control measures, such as the use of bunding.

11.7.31. Operational activities/management regimes will be controlled through the following measures:

- adherence to the Environmental Permit;

- preparation of operational emergency plans covering chemical leaks (the operational plan will be based on the procedures set out in the **Outline EPRP (Document Reference 7.11)**;
- transportation of hazardous/dangerous loads in appropriate vehicles in accordance with relevant legislation and guidance, including The Dangerous Substances (Conveyance by Road in Road Tankers and Tank Containers) Regulations[77] and International Carriage of Dangerous Goods by Road (ADR)[78];
- adherence to all relevant approved codes of practice (ACOP) and guidance including, but not limited to, the following: HSG140 Safe use and handling of flammable liquids guidance[74], L5 Control of substances hazardous to health ACOP and guidance[75] and L138 Dangerous substances and explosive atmospheres ACOP and guidance[79]; and
- when the surface water runoff is collected and enters the onsite drainage system, discharge valves at the outfall points will be kept closed initially as the runoff is tested for contamination.

11.7.32. As detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** if the runoff meets the water discharge quality standards, it will be discharged to the proposed surface water drainage network. If it fails to meet the standards and unacceptable levels of contamination are detected, the runoff would either be transferred to the Wastewater Treatment Plant for treatment or, if contaminant levels are such that they cannot be treated onsite, to an Above Ground Storage Tank prior to removal and treatment offsite under a waste transfer licence to a suitable licensed wastewater treatment facility. The controls to manage the potential for surface water pollution are included in the **Outline EPRP (Document Reference 7.11)**.

11.7.33. In addition to the measures above:

- oil storage will be designed in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001; and
- the Rich Solvent/Lean Solvent Heat Exchanger will be individually bunded. The bunds will be designed in accordance with the Control of Substances Hazardous to Health (COSHH)[80]/Control of Major Accident Hazards (COMAH)[81]/GPP[27] requirements during detailed design.

11.7.34. As part of the detailed design, an assessment of the risk for all the tanker/chemical unloading bays will be undertaken. This will determine whether they are designed as fully bunded areas or whether they will require suitable protection measures to prevent the entry of any spillages to the onsite surface water drainage systems. The bunds, if required, will be designed in accordance with the COSHH[80]/COMAH[81]/GPP[27] requirements at the detailed design stage.

11.7.35. There would be additional control measures in accordance with the ISO 14001 certification within the **Outline EPRP (Document Reference 7.11)** for the Proposed Scheme in order to control surface water runoff that could become contaminated by chemicals and oil. These will include, but not be limited to, the following:

- A minimum of twice daily checks undertaken to inspect for chemical and oil leakage. Furthermore, there will be a constant presence of key operative staff at the Carbon Capture Facility with responsibility to undertake informal checks as part of their other duties. These operative staff would undertake immediate rectification/pollution prevention measures as required.
- Bunding (where considered to be proportionate to the level of risk) or drip trays, or similar, will be installed under pumps to capture any potential leaks.
- Leakage detection systems will be considered for high-risk areas during the detailed design stage.

Fire Water

11.7.36. Fire water pollution prevention measures are incorporated within the **Outline Drainage Strategy (Document Reference 7.2)** including profiling roads towards attenuation features that will offer containment. This will enable flows from the outfalls to be isolated (e.g. via a penstock or similar), with fire waters retained within the Site. These would consequently be treated onsite or transported offsite for treatment/disposal as appropriate.

Process and Foul Water Disposal

11.7.37. Wastewater will be generated by the Water Treatment Plant itself. This will include backwash water from the ultrafiltration membrane process, concentrate from the nanofiltration membrane process and membrane cleaning solutions. Backwash water will be treated and recycled back into the cooling water supply (should hybrid cooling be selected at the detailed design stage). Membrane cleaning solutions will be neutralised.

11.7.38. Treated wastewater will be discharged to the local foul sewer (with or without treatment, depending on trade effluent consents). Prior to discharge, the sludge produced will go through a settlement process. Nanofiltration concentrate and neutralised cleaning solutions will be blended before discharge into the local foul sewer.

11.7.39. It is not proposed to recycle wastewater that has been in contact with any amine compounds and therefore this water will not be discharged to the Water Treatment Plant. The volume of amine wastewater effluent is expected to be comparatively small; therefore, the waste will be disposed of by specialised appointed Contractor(s), taking the waste offsite for disposal via road tanker.

11.7.40. Thames Water has been consulted to ensure that there can be sufficient capacity for appropriate treatment of the effluent from the Proposed Scheme within the Crossness Wastewater Treatment Works to result in no adverse changes to the final effluent discharged into the River Thames.

11.7.41. The **Outline Drainage Strategy (Document Reference 7.2)** details the treatment and disposal of foul water from welfare facilities.

Groundwater Features

11.7.42. As det our above, a Ground Investigation will be undertaken prior to the construction phase set out in the **Outline CoCP (Document Reference 7.4)** and **Section 17.7** of **Chapter 17 Ground Conditions and Soils (Volume 1)**. Future Ground Investigation will determine mitigation requirements at detailed design including considerations of changes in groundwater abstractions adjacent to the Site. If shallow groundwater levels are identified or expected within the superficial deposits mitigation to prevent groundwater flooding may include measures for additional groundwater drainage and/or formation of granular pathways to introduced flow barriers (i.e., perimeter sheet pile wall). This will ensure groundwater flow conditions are only altered locally (**Appendix 11-3: Groundwater Impact Assessment (Volume 3)**). Further information regarding the design, mitigation and enhancement measures are detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

WFD Designated Water Bodies and Coastal Processes

11.7.43. The sheet pile wall installed within the River Thames river channel will prevent potential erosion of intertidal sediment and limit the area that will be subject to ongoing maintenance dredging.

11.7.44. Maintenance dredging will be undertaken by backhoe dredging that will result in relatively minimal losses of sediment compared to other methods of dredging.

11.7.45. Measures for managing water quality during maintenance dredging will be approved by the MMO pursuant to the Deemed Marine License included as part of the **Draft DCO (Document Reference 3.1)**, including water quality monitoring and relevant seasonal and/or tidal restrictions. Measures are described in **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**.

11.7.46. The measures listed above for preventing impact to surface water and groundwater features will also be applicable to managing risk to WFD waterbodies during operation.

Flood Risk

11.7.47. To mitigate the potential impact on the risk of flooding from the Marsh Dykes resulting from the Proposed Scheme, floodplain storage compensation will be provided in some of the buffer strips (i.e. the strip of land between the Carbon Capture Facility and the watercourses) to create additional floodplain. This will manage the risk of increased flooding from the Marsh Dykes. Further details are provided in **Appendix 11-2: Flood Risk Assessment (Volume 3)** which will be secured as part of the DCO.

11.7.48. To mitigate the potential flood risk to the Proposed Scheme from a breach in the Thames Flood Defences:

- the construction of the development platform will be at a minimum elevation of 2.8m AOD for the Proposed Scheme, which includes 0.3m of freeboard above the

Environment Agency's modelled breach water level (1 in 200 year plus climate change), and

- flood sensitive equipment is to be set a minimum of 0.3m above the platform level (i.e. a minimum of 3.1m AOD).

11.7.49. This will ensure that the Proposed Scheme (equipment, plant and operatives) is safe from flooding associated with the breach of the River Thames Flood Defences as modelled by the Environment Agency.

11.7.50. Construction of the platform for the Proposed Scheme in the defended River Thames floodplain will result in a marginal increase in residual flood risk across the flood cell should a breach occur in the flood defences. As this increase is considered to be marginal and will result largely in a negligible increase in risk, no mitigation is proposed. Further details are provided in **Appendix 11-2: Flood Risk Assessment (Volume 3)**.

Potable Water Supply

11.7.51. **Chapter 2: Site and Proposed Scheme Description (Volume 1)** describes the approach to water supply, including how the potable water demand has been minimised. Further information on the feed water supply and justification of the progression of the use of potable water is provided in **Section 3.6** of **Chapter 3: Consideration of Alternatives (Volume 1)**.

Opportunities for Environmental Enhancement

11.7.52. To enable achievement of minimum 10% net gain for biodiversity, enhancement works are proposed to the ditches and watercourses in the Mitigation and Enhancement Area. More information can be found in the **Outline LaBARDS (Document Reference 7.9)** and **Appendix 7-1: Biodiversity Net Gain Report (Volume 3)**.

11.7.53. These habitat improvements will facilitate additional flows within the channels across the Mitigation and Enhancement Area to enhance and maintain the wet grassland and aquatic habitats with the creation of scrapes and grips (to assist in keeping soils moist within the wetland and to produce some variability in water level and moisture conditions). The improvements include:

- additional lengths of channel within the ditch network; and
- a new north-south connection beneath the Thames Water Access Road so that the surface water discharged from the northern catchment of the Carbon Capture Facility (see the **Outline Drainage Strategy (Document Reference 7.2)**) can flow into the Mitigation and Enhancement Area.

11.7.54. This will result in a reduction in the attenuation provided within the built development areas within the Site, thus enabling higher discharge rates into the new network of ditches within the Mitigation and Enhancement Area. Consequently, following rainfall events the peak water level will be higher facilitating the number of areas inundated and leading to habitat enhancement. This approach would likely need to be

supplemented by adding to/enhancing the flow controls (weirs, penstocks, sluices, or other similar mechanisms) which exist on the current outfalls (noting the location of the current outfalls may need alteration) of the ditch network into the Great Breach Dyke, to ensure there is no increase in flow discharge from the Site Boundary (i.e. both the Carbon Capture Facility and Mitigation and Enhancement Area).

11.8. ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

CONSTRUCTION PHASE

11.8.1. The likely significant effects for the water environment and flood risk associated with the construction phase for the Proposed Scheme are set out below.

Surface Water Features

Change in Quality of Surface Water Features

11.8.2. The following sensitive receptors could be affected by an increased sediment load and pollution risks from spillage of fuels or other harmful substances:

- River Thames;
- Crossness LNR;
- Marsh Dykes main rivers;
- Marsh Dykes ordinary watercourses; and
- Ponds.

11.8.3. The sources of impact addressed in this section include:

- increased sedimentation could be caused by surface water runoff containing elevated levels of suspended particles;
- increased pollution risks from spillage of fuels or other harmful substances;
- infilling of watercourses;
- moving of watercourses; and
- dust and debris.

11.8.4. Temporary increased sedimentation could be caused by surface water runoff containing elevated levels of suspended particles that may result from land clearance, excavation, dewatering of excavations, wheel washings, areas of bare earth, construction materials such as aggregate and stockpiles of topsoil substances associated with temporary works.

11.8.5. Runoff with high sediment loads may potentially have direct adverse impacts on adjacent water bodies through smothering natural vegetation of the drains and bed substrates which may require additional maintenance in order to maintain the capacity of the drains. Sediment can also contain organic compounds and other contaminants that can deplete oxygen levels and increase pollutant loading in the water body.

11.8.6. The magnitude of the impact is likely to be greater when working in areas adjacent to and within the sensitive receptors listed above, and in periods of heavy rainfall. Sediment is likely to settle quickly during normal flow conditions but may be dispersed during larger flood flow events. The risk of increased sedimentation in construction runoff would reduce shortly after completion of the works in close proximity to sensitive receptors when, for example, exposed areas of earth are resurfaced, reseeded or replanted. The effects of increased sedimentation would likely be short term as sediment is dispersed and vegetation is reestablished.

11.8.7. Increased pollution risks from spillage of fuels or other harmful substances associated with temporary works may migrate to the receptors listed above. Hydrocarbons form a film on the surface of the water body, deplete oxygen levels and may be toxic to fish. Even at very low concentrations, the film may negatively affect the visual appearance of the water body. If materials and activities are not stored and carried out in designated areas, runoff and washdown may enter the watercourses and ponds, adversely affecting the aquatic environment or contaminate surface water abstractions.

11.8.8. A common source of pollution is from leaks and spillages of hydrocarbons from mechanical plant or storage vessels. Concrete and cement products can also pose a significant risk to the water environment and are highly alkaline and corrosive. Fish may be physically damaged, and their gills blocked, and both vegetation and the bed of the receiving water body may be smothered. For the most part, it is only when large quantities of hazardous substances are spilled, or the spillage is directly into the river, that a significant risk of acute toxicity would arise.

11.8.9. Given the relatively flat topography of the Site and therefore expected slow migration of sediment laden runoff and other pollutants, it is considered likely that the mitigation measures described in **Section 11.7** will be appropriate to manage significant risk to the identified receptors.

11.8.10. A number of watercourses are proposed to be infilled as a result of the Proposed Scheme. The infilling of water features that is required during the construction phase can be undertaken in such a manner so as to prevent an increase in silt/sediment loads in the receiving watercourses/Marsh Dykes. The loss of water features will be offset by the enhancement/creation of new water features through the measures discussed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, **Chapter 7: Terrestrial Biodiversity (Volume 1)**, the **Outline Drainage Strategy (Document Reference 7.2)** and the **Outline LaBARDS (Document Reference 7.9)**. It is considered likely that the mitigation measures described in **Section 11.7** will be appropriate to manage significant risk to the identified receptors.

11.8.11. A number of watercourses are proposed to be moved or diverted. The design of the new watercourses would be undertaken during detailed design and in consultation with the LLFA. Norman Road Stream may require diversion or protective measures

due to the location of the platform. This will be developed during detailed design and in consultation with the Environment Agency.

11.8.12. The new watercourses provide the opportunity for a betterment in comparison to the existing watercourses as they were observed to be vegetated during the general site walkover. The new watercourses would be designed to replicate the size of the existing watercourses. It is considered likely that the mitigation measures described in **Section 11.7** will be appropriate to manage significant risk to the identified receptors.

11.8.13. Dust management procedures would be applied as detailed in **Chapter 5: Air Quality (Volume 1)** and are considered appropriate to manage significant risk to the identified receptors.

11.8.14. Taking into account the proposed mitigation measures described in **Section 11.7**, the magnitude of the potential deterioration of the receptors listed above caused by the sources of risk discussed in this section is assessed to be Negligible.

11.8.15. The sensitivity of the River Thames, Marsh Dykes (main rivers) and Marsh Dykes (ordinary watercourses) is Very High. The sensitivity of the ponds is Medium. The magnitude of impact to the receptors is Negligible. It is therefore considered that there would be a temporary, direct, short term maximum **Slight Adverse (Not Significant)** effect.

Groundwater Features

Chemical and Physical Alteration of the Superficial Deposit Aquifers

11.8.16. The Proposed Scheme has the potential to increase pollution risks to the Secondary A aquifers onsite from spillage of fuels and other harmful substances during the construction phase. Areas in which the Secondary A aquifers are at surface, spills of pollutants such as fuels, oils or vehicle hydraulic fluids could infiltrate into the ground and then into the saturated aquifers causing pollution of groundwater. Furthermore, the construction of the Proposed Scheme will involve piling (sheet pile wall for engineered back-fill and construction purposes as well as the Proposed Jetty and Carbon Capture Facility), which could create preferential pathway for contaminants to pollute groundwater. Above Ground LCO_2 Pipelines are detailed in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

11.8.17. Physical changes to the shallow subsurface because of excavation work have the potential to interrupt shallow groundwater flow paths within the superficial deposits by introducing groundwater flow barriers resulting in the interruption of groundwater pathways and result in changes (locally) to groundwater flow direction and levels. This would include civil works sheet piling, any excavations associated with the enabling works including the preparation of laydown areas, construction compound, site preparation, levelling and piling and any excavation (i.e. open-trenching) or below ground structures related to the Carbon Capture Facility (including piling works) and connection to Riverside 1 and Riverside 2.

11.8.18. Modifications to groundwater conditions, including groundwater level and flow, by excavations (i.e. open trenching and sheet pile walls) or pumping during the construction phase may cause alteration to groundwater receptors and result in a temporary loss of water from storage within Secondary A aquifers (Medium Sensitivity).

11.8.19. There is potential for soils and groundwater quality to be impacted by contaminants present within the Site due to the nature of historical site use. Construction phase activities (such as drilling, piling, excavation and dredging) have the potential to create new migratory pathways for contaminants to superficial deposit aquifers (Medium sensitivity) with potential chemical alteration. Details of pollutant impacts to superficial deposit aquifers and relevant mitigation measures are provided in **Section 17.8** of **Chapter 17: Ground Conditions and Soils (Volume 1)**. The risks to controlled waters from the Proposed Scheme will be considered and mitigated via ground investigation and remediation work where required. To mitigate preferential pathways to controlled waters that result from construction phase activities, a Piling Risk Assessment, Materials Management Plan, Earthworks Specification and/or Remediation Strategy (as appropriate) would be produced (see **Chapter 17: Ground Conditions and Soils (Volume 1)**). The magnitude of change of the superficial deposit aquifers, prior to additional mitigation is No Change and the sensitivity is Medium**.** Therefore, the likely effect of the Proposed Scheme on the superficial deposit aquifers during construction has been assessed as temporary, direct, long term, **Neutral (Not Significant)** effect.

Chemical and Physical Alteration of the Principal Aquifer

11.8.20. The Proposed Scheme has the potential to increase pollution risk to the Chalk Group (Principal aquifer) from spillage of fuels and other harmful substances during the construction phase. Where the Chalk Group is in hydraulic connectivity with the overlying deposits at surface, (**Section 11.6.24**) spills of fuels, oils or wet concrete could migrate through the topsoils and superficial deposits into the Chalk Group, causing it to be polluted by hazardous substances (**Chapter 17: Ground Conditions and Soils (Volume 1)**). Furthermore, the Proposed Scheme includes below ground structures (i.e. construction piling, dredging and sheet piled walls), which could create a preferential pathway for contaminants to pollute groundwater within the Principal Chalk aquifer.

11.8.21. Physical changes to the deeper subsurface (>20m below ground surface) have potential to interrupt deeper groundwater flow paths. This would include earthworks and civil works associated to construction phase activities (i.e. construction piling, dredging and sheet piling). Due to the depth of the Chalk Group (Principal aquifer), which was not intercepted during the previous GI, it is not expected that deep groundwater quantity and quality within this unit would be impacted (directly and indirectly) by the Proposed Scheme.

11.8.22. The magnitude of change of the Chalk Group (Principal aquifer), prior to additional mitigation is Minor and the sensitivity is High**.** Therefore, the likely effect of the Proposed Scheme on the Principal aquifer during construction has been assessed as temporary, direct, short term, **Slight Adverse (Not Significant)** effect.

11.8.23. The risks to controlled waters from the Proposed Scheme will be considered and mitigated via ground investigation and remediation work where required. To mitigate preferential pathways to controlled waters that result from construction phase activities, a Piling Risk Assessment, Materials Management Plan, Earthworks Specification and/or Remediation Strategy (as appropriate) would be produced (further information is presented in **Chapter 17: Ground Conditions and Soils (Volume 1)**).

Pollution of the Groundwater Abstractions for Non-potable Use

11.8.24. There are two licenced industrial abstraction boreholes within the Groundwater Study Area that are abstracting from superficial (sand and gravels) and bedrock (Chalk Group) aquifers **(Table 11-14)**. As outlined in **Section 11.6**, groundwater flows (locally) onsite will be influenced by the dewatering borehole for Riverside 2 located in the northwest of the Site Boundary. Any pollution spilled on site into the superficial deposit aquifers would likely migrate in a north-westerly direction towards the dewatering borehole for Riverside 2 while under operation. Upon cessation of the dewatering licence (in January 2025), it assumed that groundwater will rebound/recover to pre-construction levels and the natural groundwater flow path will be to the north towards the River Thames.

11.8.25. The magnitude of change to the groundwater abstractions for non-potable use is Minor and the sensitivity is Medium**.** Therefore, the likely effects of the Proposed Scheme to non-potable groundwater abstractions identified within the Groundwater Study Area during the construction phase has been assessed as a temporary, indirect, short term **Slight Adverse (Not Significant)** effect.

11.8.26. A summary of groundwater quality is provided in **Appendix 17-1: Preliminary Risk Assessment (Volume 3)**. The land use of the Site has remained relatively unchanged with the historical and subsequent GI confirming the presence of existing contamination (heavy metals and olfactory) and elevated concentrations of salt within shallow groundwater (Made Ground, Alluvium and Taplow Gravel Member) which suggests saline intrusion from the River Thames already exists. The impact on controlled waters during construction is assessed in **Chapter 17: Ground Conditions and Soils (Volume 1)** and **Section 7.3** of **Appendix 17-1: Preliminary Risk Assessment (Volume 3)**.

WFD Designated Water Bodies

Change in the Biological, Physico-chemical and Hydromorphological Quality Elements of the WFD Designated Water Bodies

11.8.27. The following sensitive receptors could be affected by a deterioration of the WFD status:

- River Thames (Thames Middle Transitional Water WFD Water Body); and
- Greenwich Tertiaries and Chalk WFD Groundwater Body.

11.8.28. The construction works could pose a risk to the deterioration of the WFD status including changes to the hydromorphological, physico-chemical and ecological quality of the Thames Middle Transitional WFD Water Body and the Greenwich Tertiaries and Chalk WFD Groundwater Body. **Appendix 11-1: Water Framework Directive Assessment (Volume 3)** states that the assessment of potential construction impacts against WFD quality elements, WFD status and WFD objectives concludes that no deterioration is anticipated as a result of the Proposed Scheme with the embedded mitigation measures in place. **Appendix 11-1: Water Framework Directive Assessment (Volume 3)** contains a detailed assessment of the Proposed Scheme against the WFD.

11.8.29. Taking into account the mitigation measures identified above in **Section 11.7** and in **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**, the magnitude of the impact would be **Negligible**. The sensitivity of the River Thames WFD designated water body is Very High and the sensitivity of the Greenwich Tertiaries and Chalk WFD Groundwater Body is Medium. It is therefore considered that there would be a temporary, direct, short term **Slight Adverse (Not Significant)** effect.

Coastal Processes

Changes to Sediment Processes and Habitats

11.8.30. The following sensitive receptors could be affected by changes to coastal sediment processes:

- River Thames.

11.8.31. The greatest risks to coastal processes within the River Thames are associated with the construction of the Proposed Jetty and, specifically, the capital dredging required to create the required berth pocket.

11.8.32. The Coastal Processes Assessment (**Appendix 11-4: Coastal Modelling Studies (Volume 3)**) demonstrates that the construction of the Proposed Scheme (including capital dredging) can be undertaken in such a manner that there are no significant impacts on or changes to the coastal processes and the River Thames.

11.8.33. Taking into account the mitigation measures identified above in **Section 11.7** and in **Appendix 11-4: Coastal Modelling Studies (Volume 3)**, the magnitude of the impact would be Negligible. The sensitivity of the River Thames is Very High. It is therefore considered that there would be a temporary, indirect, short term **Slight Adverse (Not Significant)** effect.

Flood Risk

Change in Local Flood Risk

11.8.34. The following sensitive receptors could be affected by an increase in local flood risks:

- NPPF less vulnerable land;
- NPPF more vulnerable land;
- NPPF essential infrastructure; and
- NPPF water compatible land.

11.8.35. **Appendix 11-2: Flood Risk Assessment (Volume 3)** demonstrates that during the construction of the Proposed Scheme local flood risk would not increase.

11.8.36. Taking into account the mitigation measures identified above in **Section 11.7** and in **Appendix 11-2: Flood Risk Assessment (Volume 3)**, the magnitude of the impact would be Negligible. The sensitivity of the NPPF less vulnerable land is Medium, more vulnerable land is High, essential infrastructure is Very High and water compatible land is Low. It is therefore considered that there would be a temporary, indirect, short term overall **Slight Adverse (Not Significant)** effect.

11.8.37. The current design includes proposals for a perimeter sheet pile wall to retain engineering backfill used to raise the platform to a future ground level (approximately 2.8m AOD). As the Proposed Scheme is located at or below ground level (i.e. below ground structures such as sheet pile walls), there is a risk that groundwater flooding could affect the Proposed Scheme during its construction if not managed. Changes to groundwater flow pathways due to below ground structures (i.e. sheet pile walls) extending below the groundwater table and forming groundwater flow barriers may increase pore water pressures and increase the risk of groundwater flooding (**Appendix 11-3: Groundwater Impact Assessment (Volume 3)**).

11.8.38. The Site is covered by Alluvium and the Taplow Gravel Member that are considered low permeability deposits. Variations in groundwater flow and level (locally) are expected due to the presence of drains and watercourses surrounding the Site as well as tidal influence from the River Thames. Below ground structures (i.e. sheet pile walls and piling) have the potential to act as groundwater flow barriers which due to the limited porosity and permeability of the superficial deposits (Alluvium and Taplow Gravel Member) could lead to a water table increase (upgradient of the structure) and, in the worst case, cause groundwater flooding if no groundwater sinks are available (i.e. groundwater drainage/ditches).

11.8.39. The perimeter sheet pile wall will be approximately 15m in depth (approximately 2m of this above ground level and 10m bgl) founded within the Taplow Gravel Member (**Medium** sensitivity) and would penetrate groundwater levels within the superficial deposits (**Appendix 11-3: Groundwater Impact Assessment (Volume 3)**). Groundwater flow barriers result in the interruption of groundwater pathways and result in changes (locally) to groundwater flow direction and levels within the superficial deposits. Taking into account the mitigation measures identified above in **Section 11.7**, the magnitude of the impact would be Minor Adverse. The sensitivity of the Taplow Gravel Member is Medium. It is therefore considered that there would be a temporary, direct, short term overall **Slight Adverse (Not Significant)** effect.

Potable Water Supply

Increase in Demand for Potable Water

11.8.40. The following sensitive receptors could be affected by an increase in demand for potable water:

- potable water supply/London Water Resource Zone.

11.8.41. The potable water demands during construction are not likely to be significant and will be within the headroom of the existing supply capacity of Thames Water. The Proposed Scheme would therefore not have any impacts on potable water resources and the water environment during the construction phase.

11.8.42. The magnitude of the impact would be Negligible. The sensitivity of the potable water supply and London Water Resource Zone is Very High. It is therefore considered that there would be a temporary, indirect, short term **Slight Adverse (Not Significant)** effect.

OPERATION PHASE

11.8.43. The likely significant effects for the water environment and flood risk associated with the operation phase are set out below.

Surface Water Features

Change in the Quality of Surface Water Features

11.8.44. The following sensitive receptors have been considered in this assessment:

- River Thames;
- Marsh Dykes main rivers;
- Marsh Dykes ordinary watercourses; and
- Ponds.

11.8.45. The identified receptors have the potential to be affected by: pollutants contained in routine surface water runoff that would be discharged to via the surface water drainage system; spillages of pollutants and harmful substances that could migrate

overland or via the surface water drainage system; or potentially contaminated firewater that that could migrate overland or via the surface water drainage system. The **Outline Drainage Strategy (Document Reference 7.2)** discharges into the Marsh Dykes network before being pumped into the River Thames.

11.8.46. Taking into account the mitigation measures described in **Section 11.7**, the magnitude of the potential deterioration of the water quality of Marsh Dykes (main rivers and ordinary watercourses), the River Thames and ponds caused by a potential releases of hydrocarbons, oils and other pollutants contained in routine runoff generated in the area of the Proposed Scheme is assessed to be Negligible.

11.8.47. The sensitivity of the River Thames, Marsh Dykes (main rivers) and Marsh Dykes (ordinary watercourses) is Very High. The sensitivity of the ponds is Medium. Taking into account the mitigation measures identified above, the magnitude of the impact would be Negligible. It is therefore considered that there would be a temporary, indirect, short term maximum **Slight Adverse (Not Significant)** effect. Impacts are considered to be temporary and short term as discharge would not be continuous and the receiving water features would recover over time.

Groundwater Features

Pollution Impacts to Groundwater Quality

11.8.48. The Proposed Scheme has the potential to effect to identified groundwater receptors via pollutants contained in routine surface water runoff and spillages of pollutants and harmful substances.

11.8.49. Taking into account the mitigation measures described in **Section 11.7** and given all drainage features will be lined and no infiltration to ground is expected, the magnitude of change is considered to be Negligible. Due to the limited porosity and permeability of the superficial deposits (Alluvium and Taplow Gravel Member classified Medium sensitivity) and depth to the bedrock aquifers (Thanet Sands, Lambeth Group and Chalk Group) it is considered that there would be a temporary, indirect, long term **Neutral (Not Significant)** effect.

Changes to Groundwater Flow Paths

11.8.50. Operation phase impacts are expected to be limited to shallow groundwater affecting flow within the superficial deposit aquifers. Below ground structures (i.e. sheet pile walls) that extend below the groundwater table, and forming groundwater flow barriers, may increase pore water pressures and the risk of groundwater flooding at operation phase. Due to the limited porosity and permeability of the superficial deposits (Alluvium and Taplow Gravel Member classified Medium sensitivity) introduction of groundwater flow barriers could lead to significant water table rise up (up-gradient of the structure) and, in the worst case, causing groundwater flooding if no groundwater sinks are available (i.e., groundwater drainage and/or formation of granular flow pathways to enhance vertical and lateral hydraulic continuity).

11.8.51. Considering the widespread presence of drains and watercourses surrounding the Site as well as the tidal influence from the River Thames and relatively flat topography, groundwater flow through the development site is limited. Local changes in groundwater flow conditions are unlikely to change on the basis that there will not be a significant amount of water moving across the Site where boundary conditions already exist (River Thames, tidal influence and surface water features). Groundwater flow conditions are unlikely to change a substantial diversion to the Environment Agency Great Breach Pumping Station to the northwest of the Site. The sensitivity of the Taplow Gravel Member is Medium. Taking into account the mitigation measures identified above, the magnitude of the impact would be Negligible. It is therefore considered that there would be a direct, temporary, long term **Slight Adverse (Not Significant)** effect.

11.8.52. Where potential groundwater flows could emerge because of the installation of the perimeter sheet pile wall on site, a risk of groundwater flooding remains. A residual flood risk due to the potential groundwater flows emerging as part of the scheme development during operation remains, even with the implementation of the mitigation measures outlined in **Section 11.7**. The sensitivity of the Taplow Gravel Member is Medium. Based on the current design, the magnitude of impact (locally) is expected to be Minor. It is therefore considered that there would be a direct, temporary, long term **Slight Adverse (Not Significant)** residual effect.

WFD Designated Water Bodies

Change in the biological, physico-chemical and hydromorphological quality elements of the WFD designated water bodies

11.8.53. The following sensitive receptors could be affected by a deterioration of the WFD status:

- River Thames (Thames Middle Transitional WFD Water Body); and
- Greenwich Tertiaries and Chalk WFD Groundwater Body.

11.8.54. The operation of the Proposed Scheme could pose a risk to the deterioration of the WFD status including changes to the hydromorphological, physico-chemical and ecological quality of the River Thames and the Greenwich Tertiaries and Chalk WFD Groundwater Body. **Appendix 11-1: Water Framework Directive Assessment (Volume 3)** states that the assessment of potential operational impacts against WFD quality elements, WFD status and WFD objectives concludes that no deterioration is anticipated as a result of the Proposed Scheme with the embedded mitigation described in **Section 11.7** in place.

11.8.55. **Appendix 11-1: Water Framework Directive Assessment (Volume 3)** includes a full assessment of the Proposed Scheme against the WFD.

11.8.56. Taking into account the mitigation measures identified above in **Section 11.7** and in **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**, the

magnitude of the impact would be Negligible. The sensitivity of the River Thames WFD designated water body is Very High and the sensitivity of the Greenwich Tertiaries and Chalk WFD Groundwater Body is Medium. It is therefore considered that there would be a permanent, indirect, long term maximum **Slight Adverse (Not Significant)** effect.

11.8.57. Sediment sampling to understand potential contamination at the depth of the proposed dredge pocket has not yet been undertaken. This will be agreed with the MMO in consultation with CEFAS prior to commencement of works and will verify the findings of the **Appendix 11-1: Water Framework Directive Assessment (Volume 3)**.

Coastal Processes

Changes to Sediment Processes and Habitats

11.8.58. The following sensitive receptors could be affected by changes to sediment processes:

- River Thames.

11.8.59. The greatest risks to coastal processes within the River Thames are associated with the impacts of the Proposed Jetty (and sheet piled wall) on flow dynamics (including changes to deposition and scour) and ongoing maintenance dredging to maintain the required water depths at the berth pockets. Consideration has also been given to potential changes in flow dynamics should the existing Belvedere Power Station Jetty (disused) be removed.

11.8.60. **Appendix 11-4: Coastal Modelling Studies (Volume 3)** demonstrates that the operation of the Proposed Scheme can be undertaken in such a manner that there are no significant impacts on or changes to the coastal processes of the River Thames either with or without the Belvedere Power Station Jetty (disused). This includes no predicted change to the deposition or erosion of the tidal mudflats in the vicinity of the Proposed Scheme, or to deposition or erosion within the existing navigation channels of the River Thames.

11.8.61. The hydraulic modelling results whether the Belvedere Jetty (disused) is demolished or not are similar. This suggests that the removal of this structure is unlikely to have any adverse impacts on the priority intertidal mudflat habitat.

11.8.62. Taking into account the mitigation measures identified above in **Section 11.7**, the magnitude of the impact is considered to be Negligible. The sensitivity of the River Thames is Very High. It is therefore considered that there would be a permanent, indirect, long term **Slight Adverse (Not Significant)** effect.

Flood Risk

Change in Local Flood Risks

11.8.63. The following sensitive receptors could be affected by an increase in local flood risks:

- NPPF less vulnerable land;
- NPPF more vulnerable land;
- NPPF essential infrastructure; and
- NPPF water compatible land.

11.8.64. **Appendix 11-2: Flood Risk Assessment (Volume 3)** provides the assessment regarding flood risk in relation to operation of the Proposed Scheme. The assessment concludes that the Proposed Scheme will result in no change in fluvial flooding from the Marsh Dykes due to the provision of floodplain compensation.

11.8.65. **Appendix 11-2: Flood Risk Assessment (Volume 3)** concludes that the Proposed Scheme will not be at risk of flooding from a breach of the River Thames flood defences as modelled by the Environment Agency.

11.8.66. There remains a residual increase of risk to users of third party land in close proximity to the Proposed Scheme should a breach occur in the River Thames Flood Defences. The risk decreases with distance as water levels reach equilibrium across the flood cell. Further information is provided in **Appendix 11-2: Flood Risk Assessment (Volume 3)**.

11.8.67. Taking into account the mitigation measures identified above in **Section 11.7** and in **Appendix 11-2: Flood Risk Assessment (Volume 3)**, the magnitude of the impact would be Minor Adverse for the wider flood cell and residential areas due to a predicted increase of 14mm in flood depths (1 in 200 year event). The sensitivity of the NPPF more vulnerable land is High. It is therefore considered that there would be a temporary, indirect, short term **Slight Adverse (Not Significant)** effect.

11.8.68. Taking into account the mitigation measures identified above in **Section 11.7** and in **Appendix 11-2: Flood Risk Assessment (Volume 3)**, the magnitude of the impact would be Minor Adverse for the Retail outlets, general industry, storage and distribution areas located to the east of the Proposed Scheme. This is due to a predicted increase of 10mm in flood depths (1 in 200 year event). The sensitivity of the NPPF less vulnerable land is Medium. It is therefore considered that there would be a temporary, indirect, short term **Slight Adverse (Not Significant)** effect.

11.8.69. Taking into account the mitigation measures identified above in **Section 11.7** and in **Appendix 11-2: Flood Risk Assessment (Volume 3)**, the magnitude of the impact would be Major Adverse for the Carbon Capture Facility. This is due to a predicted increase of flood water to a height of approximately 3.5m AOD (1 in 200 year event). This is largely caused by a localised increase caused by the channelling of flood waters between Riverside 1 and Riverside 2 during a breach event. The sensitivity of the NPPF essential infrastructure is Very High. It is therefore considered that there

would be a temporary, indirect, short term **Major Adverse (Significant)** effect when considering the embedded mitigation. The additional mitigation detailed in **Section 11.9** and in **Appendix 11-2: Flood Risk Assessment (Volume 3)** would reduce the magnitude of impact to **Negligible** and therefore it is considered that there would be a temporary, indirect, short term **Slight Adverse (Not Significant)** effect when considering the additional mitigation measures. Taking into account the mitigation measures identified above in **Section 11.7** and in **Appendix 11-2: Flood Risk Assessment (Volume 3)**, the magnitude of the impact would be Major Adverse for the Crossness LNR. This is due to a predicted increase of 100mm in flood depths (1 in 200 year event). The increase is largely located within the Site Boundary and Crossness LNR is classified as water compatible. The sensitivity of the NPPF water compatible land is Low. It is therefore considered that there would be a temporary, indirect, short term **Slight Adverse (Not Significant)** effect.

11.8.70. Operation phase impacts are expected to be limited to shallow groundwater affecting flow within the superficial deposit aquifers (Alluvium and Taplow Gravel Members) classified Medium sensitivity. The current design includes proposals for below ground structures (i.e., sheet pile walls) that extend below the groundwater table, and forming groundwater flow barriers, may increase pore water pressures and the risk of groundwater flooding.

11.8.71. Due to the limited porosity of the superficial deposits introduction of groundwater flow barriers could lead to significant water table rise-up and in the worse-case, causing groundwater flooding if no groundwater sinks are available (i.e, groundwater drainage/ditches). Such works, for the proposed below ground structures could potentially cause groundwater flooding (**Section 11.6**) and the magnitude of impact (locally) is expected to be Minor thus resulting in a direct, temporary, short term **Slight Adverse (Not Significant)** effect.

Potable Water

Increase in demand for potable water

11.8.72. As detailed in the Charlton to Bexley Riverside Integrated Water Management Strategy[9] and Thames Water's Water Resource Management Plan[64], Thames Water has developed a plan for addressing the forecast deficit in the London Water Resource Zone through implementation of a twin-track approach combining demand management with resource development. The Plan is reliant on significant demand reduction measures from existing property and highlights the need for new developments to minimise water use and help identify innovative solutions to delivering alternative supplies.

11.8.73. **Chapter 2: Project Scheme and Site Description (Volume 1)** provides a description of the water usage requirements for the Proposed Scheme and **Chapter 3: Consideration of Alternatives (Volume 1)** explains the justification for progressing with the selected options for water usage. This sets out the measures incorporated

into the design of the Proposed Scheme to minimise potable water use through the use of appropriate technologies and an innovative approach. The embedded measures are set out in **Section 11.7**.

11.8.74. Therefore, it is considered that the Proposed Scheme is in accordance with the Draft Water Resource Management Plan[64] and that impacts to potable water demand during operation are not likely to be significant (as described in **Section 11.4**). Furthermore, Thames Water (as the statutory water undertaker) will determine the volume of potable water within the water supply system that can be used to contribute to the feed water supply for the Proposed Scheme.

11.8.75. Taking into account the mitigation measures identified above in **Section 11.7**, the magnitude of the impact would be Negligible (Not Significant). The sensitivity of the potable water supply and London Water Resource Zone is Very High. It is therefore considered that there would be a temporary, indirect, short term **Slight Adverse (Not Significant)** effect.

11.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

WFD DESIGNATED WATERBODIES

11.9.1. As described in **Appendix 11-1: Water Framework Directive Assessment (Volume 3)** sediment sampling at depth will be undertaken to inform detailed design. Information gathered through this sampling will inform subsequent additional mitigation if sediments are shown to be elevated in contaminant concentrations. Sediment sampling will be undertaken pursuant to the terms of the Deemed Marine Licence contained in the **Draft DCO (Document Reference 3.1)**.

FLOOD RISK

11.9.2. The Environment Agency's 2018 Thames Estuary Breach model[52] and the Cory Thames Estuary Breach model can be considered a worst case assessment of the residual flood risk. This is because the Thames Estuary Breach model considers a simultaneous event of failure of the network of watercourses (and associated culverts) and pumping stations occurring at the same time as the failure of the River Thames Flood Defences. This scenario is considered to have a very low probability of occurrence.

11.9.3. In the worst case residual risk scenario, defined by the results of the Cory Thames Estuary Breach Model, if a breach should occur between Riverside 1 and Riverside 2, then the depth of flood waters adjacent to the Carbon Capture Facility platform would be greater than the maximum breach flood level from the Cory Thames Estuary Breach Assessment and would overtop and inundate the platform of the Proposed Scheme. This is a result of the flood waters being constrained between Riverside 1 and Riverside 2 and channelled directly at the platform. As such, detailed design will

need to include a Flood Defence Wall located along the top of the platform to ensure that the platform is protected to a minimum height of 300mm above the maximum flood level (noting the flood level decreases with distance from Riverside 1 and Riverside 2). This wall could tie into the proposed buildings, with demountable defences across the access roads as required.

11.9.4. This approach can be implemented in such a manner that disruption to the operation of the Site (changes to the one way circulation around site roads) as a result of the demountable barriers being in place only occurs when the water levels of the River Thames are predicted to reach a level which should a breach occur could result in the platform being inundated.

11.9.5. The measures in **Appendix 11-2: Flood Risk Assessment (Volume 3)** are secured via a requirement in the **Draft DCO (Document Reference 3.1)**.

11.10. MONITORING

11.10.1. A Ground investigation will be undertaken prior to the construction phase as secured by a requirement within the **Draft DCO (Document Reference 3.1)** and set out in the **Outline CoCP (Document Reference 7.4)** and **Section 17.7** and **Section 17.9** of **Chapter 17: Ground Conditions and Soils (Volume 1).** As shown in **Figure 17-3: Connections between the Ground Conditions Mitigation Tasks and Design** in **Chapter 17: Ground Conditions and Soils (Volume 1)**, future ground investigations will determine mitigation requirements at detailed design including considerations of changes in groundwater abstractions (Riverside 2) adjacent to the Site and recommendations for groundwater and surface water monitoring (**Section 11.9**).

11.11. RESIDUAL EFFECTS

11.11.1. **Table 11-17** below summarises the residual effects associated with the Proposed Scheme.

Table 11-17: Water Environment and Flood Risk Summary of Residual Effects

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Construction Phase				
Change in quality of surface water features	River Thames Marsh Dykes (main rivers) Marsh Dykes (ordinary watercourses) Ponds	**Slight Adverse (Not Significant)**	No additional measures.	**Slight Adverse (Not Significant)**
Chemical and physical alteration of the Superficial Deposit Aquifers (including groundwater flow barriers)	Superficial deposit aquifers designated Secondary Undifferentiated aquifers (Alluvium and Head Deposits) and Secondary A aquifer (Taplow Gravel Member)	**Neutral (Not Significant)**	**Chapter 17: Ground Conditions and Soils (Volume 1)** and **Appendix 11-3: Groundwater Impact Assessment (Volume 3)** describes additional mitigation measures related to groundwater impacts.	**Neutral (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Chemical and physical alteration of the Principal Aquifer	Bedrock aquifer designated a Principal aquifer (Chalk Group) Thanet Sand and Lambeth Group (bedrock) Secondary A aquifer	**Slight Adverse (Not Significant)**	**Chapter 17: Ground Conditions and Soils (Volume 1)** and **Appendix 17-1: Preliminary Risk Assessment (Volume 3)** describes additional mitigation measures related to groundwater impacts.	**Slight Adverse (Not Significant)**
Pollution of the groundwater abstractions for non-potable use	Groundwater Abstractions for non-potable use	**Slight Adverse (Not Significant)**	**Chapter 17: Ground Conditions and Soils (Volume 1)** describes additional mitigation measures related to groundwater impacts.	**Slight Adverse (Not Significant)**
Change in the biological, physico-chemical and hydromorphological quality elements of the	River Thames (including Thames Middle Transitional WFD Water Body)	**Slight Adverse (Not Significant)**	No additional measures.	**Slight Adverse (Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
WFD designated water bodies	Greenwich Tertiaries and Chalk WFD Groundwater Body			
Changes to sediment processes and habitats	River Thames	**Slight Adverse (Not Significant)**	No additional measures.	**Slight Adverse (Not Significant)**
Change in local flood risks (from all sources of flooding)	NPPF less vulnerable land NPPF more vulnerable land NPPF essential infrastructure NPPF water compatible land Secondary A aquifer (Taplow Gravel Member)	**Slight Adverse (Not Significant)**	Additional mitigation is outlined in **Section 11.9**.	**Slight Adverse (Not Significant)**
Increase in demand for potable water	Potable Water supply/ London Water Resource Zone	**Slight Adverse** **(Not Significant)**	No additional measures.	**Slight Adverse** **(Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Operation Phase				
Change in the quality of surface water features	River Thames Marsh Dykes (main rivers) Marsh Dykes (ordinary watercourses) Ponds	**Slight Adverse (Not Significant)**	No additional measures	**Slight Adverse (Not Significant)**
Pollution Impacts to Groundwater Quality	Superficial deposit aquifers designated Secondary Undifferentiated aquifers (Alluvium and Head Deposits) and Secondary A aquifer (Taplow Gravel Member)	**Neutral (Not Significant)**	**Chapter 17: Ground Conditions and Soils (Volume 1)** and **Appendix 17-1: Preliminary Risk Assessment (Volume 3)** describes additional mitigation measures related to groundwater impacts.	**Neutral (Not Significant)**
Changes to groundwater flow paths	Superficial deposit aquifers designated	**Slight Adverse**	**Chapter 17: Ground Conditions and Soils**	**Slight Adverse**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
(including groundwater flow barriers)	Secondary Undifferentiated aquifers (Alluvium and Head Deposits) and Secondary A aquifer (Taplow Gravel Member) Environment Agency Pumping Station – Great Breach Pumping Station	**(Not Significant)**	**(Volume 1)** and **Appendix 11-3: Groundwater Impact Assessment (Volume 3)** describes additional mitigation measures related to groundwater impacts.	**(Not Significant)**
Change in the biological, physico-chemical and hydromorphological quality elements of the WFD designated water bodies	River Thames (including Thames Middle Transitional WFD Water Body) Greenwich Tertiaries and Chalk WFD Groundwater Body	**Slight Adverse** **(Not Significant)**	No additional measures.	**Slight Adverse** **(Not Significant)**
Changes to the sediment processes and habitats	River Thames	**Slight Adverse** **(Not Significant)**	No additional measures.	**Slight Adverse** **(Not Significant)**

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement Measure	Residual Effect
Change in local flood risk (from all sources of flooding)	NPPF less vulnerable land NPPF more vulnerable land NPPF essential infrastructure NPPF water compatible land Secondary A aquifer (Taplow Gravel Member)	**Slight Adverse (Not Significant)**	Additional mitigation is outlined in **Section 11.9**.	**Slight Adverse (Not Significant)**
Increase in demand for potable water	Potable Water supply/London Water Resource Zone	**Slight Adverse (Not Significant)**	No additional measures.	**Slight Adverse (Not Significant)**

11.12. LIMITATIONS AND ASSUMPTIONS

11.12.1. This section outlines the limitations, uncertainties, and assumptions made in undertaking the water environment and flood risk assessment reported in this chapter:

- This assessment has relied, in part, on data provided by third parties that are the most up-to-date available at the time of writing. No significant changes or limitations in these datasets (in space or time) have been identified that would affect the robustness of the assessment.
- It is assumed that activities undertaken during the construction phase that have the potential to affect ground conditions and soils will be undertaken in accordance with the mitigation measures set out in **Section 17.8** of **Chapter 17: Ground Conditions and Soils (Volume 1)** and as secured by a requirement within the **Draft DCO (Document Reference 3.1)**. Piling, demolition, excavation and site level raising (including construction of the sheet piled wall) will be undertaken with the implementation of an appropriate Piling Risk Assessment, Demolition Specification, Materials Management Plan (MMP), and Earthworks Specification (**Chapter 17: Ground Conditions and Soils (Volume 1)** and **Chapter 16: Materials and Waste)**).
- Based on the design information available at the time of writing, the sheet pile wall (required for construction in order to retain engineered backfill used to raise the land to a future ground level) will be to a maximum depth of 12m bgl. It has been established that the founding geology strata is likely to be the Taplow Gravels Member (superficial deposits) and dewatering is not anticipated to be required for the sheet piling installation.
- No sediment contamination analysis at the depth of the dredge pocket has been undertaken to support this assessment.
- Dredging will be managed by the pursuant to the provisions of the Deemed Marine Licence, contained within the **Draft DCO (Document Reference 3.1)**.

11.13. REFERENCES

[1] Department for Energy Security and Net Zero. (2024). 'Overarching National Policy Statement for Energy (EN-1)'. Available at: https://assets.publishing.service.gov.uk/media/655dc190d03a8d001207fe33/overarching-nps-for-energy-en1.pdf

[2] Department for Levelling Up, Housing and Communities. (2023). 'National Planning Policy Framework'. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

[3] Greater London Authority. (2021). 'The London Plan'. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

[4] London Borough of Bexley. (2023). 'The Bexley Local Plan 2023'. Available at: https://www.bexley.gov.uk/sites/default/files/2023-07/bexley-local-plan-adopted-26-april-2023.pdf

[5] Greater London Authority. (2018). 'London Environment Strategy'. Available at: https://www.london.gov.uk/sites/default/files/london_environment_strategy_0.pdf

[6] Wood. (2019). 'London Borough of Bexley Strategic Flood Risk Assessment Level-1'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-05/Strategic-flood-risk-assessment-level-1-November-2020.pdf

[7] Wood. (2020). 'Bexley Strategic Flood Risk Assessment Level-2'. Available at: Strategic-flood-risk-assessment-level-2-may-2021.pdf (bexley.gov.uk)

[8] London Borough of Bexley. (2017). 'Local Flood Risk Management Strategy: London Borough of Bexley'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-01/Local-Flood-Risk-Management-Strategy.pdf

[9] Great London Authority. (2017). 'Charlton to Bexley Riverside Integrated Water Management Strategy'. Available at: https://www.bexley.gov.uk/sites/default/files/2021-10/Charlton-to-bexley-riverside-integrated-water-management-strategy-2017.pdf

[10] Department for Environment, Food and Rural Affairs. (2021). 'South East Inshore Marine Plan 2021'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004493/FINAL_South_East_Marine_Plan__1_.pdf

[11] HMSO. (2022). 'Thames River Basin District River Basin Management Plan'. Available at: https://www.gov.uk/guidance/thames-river-basin-district-river-basin-management-plan-updated-2022

[12] HM Government. (2010). 'Flood and Water Management Act'. Available at: http://www.legislation.gov.uk/uksi/2017/407/contents/made

[13] HM Government. (2018). 'The Environmental Permitting (England and Wales) (Amendment) Regulations 2018'. Available at: https://www.legislation.gov.uk/uksi/2018/110/contents/made

[14] HM Government. (1991). 'Land Drainage Act'. Available at: http://www.legislation.gov.uk/ukpga/1991/59/contents

[15] HM Government. (2017). 'The Water Environment (Water Framework Directive) (England and Wales) Regulations'. Available at: https://www.legislation.gov.uk/uksi/2017/407/contents/made

[16] HM Government. (1991). 'The Water Resources Act'. Available at: http://www.legislation.gov.uk/ukpga/1991/57/contents

[17] HM Government. (2015). 'The Environmental Damage (Prevention and Remediation) (England) Regulation'. Available at: https://www.legislation.gov.uk/uksi/2015/810/contents

[18] HM Government. (1991). 'The Water Industry Act 1991'. Available at: https://www.legislation.gov.uk/ukpga/1991/56/contents

[19] HM Government. (2003). 'The Water Act'. Available at: https://www.legislation.gov.uk/ukpga/2003/37/contents

[20] HM Government. (2014). 'The Water Act'. Available at: https://www.legislation.gov.uk/ukpga/2014/21

[21] HM Government. (2016). 'The Groundwater (Water Framework Directive) (England) Direction 2016'. Available at: https://www.legislation.gov.uk/uksi/2015/1623/pdfs/uksiod_20151623_en.pdf

[22] HM Government. (2021). 'Environment Act'. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

[23] HM Government. (1879). 'Metropolis Management (Thames River Prevention of Floods) Amendment Act'. Available at: https://www.legislation.gov.uk/ukla/Vict/42-43/198/resources

[24] HM Government. (2008). 'Climate Change Act 2008'. Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents

[25] UK Gov. (2022). 'UK Climate Change Risk Assessment 2022'. Available at: https://assets.publishing.service.gov.uk/media/61e54d8f8fa8f505985ef3c7/climate-change-risk-assessment-2022.pdf

[26] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government. (2022). 'National Planning Practice Guidance, Flood risk and coastal change'. Available at: https://www.gov.uk/guidance/flood-risk-and-coastal-change

[27] Netregs. 'Guidance for Pollution Prevention (GPP)'. Available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/

[28] UK Gov. (2023). 'Pollution Prevention for Businesses'. Available at: https://www.gov.uk/guidance/pollution-prevention-for-businesses

[29] Planning Inspectorate. (2023). 'Environmental Impact Assessment Scoping Opinion: Cory Decarbonisation Project.' Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010128/EN010128-000026-EN010128%20-%20Scoping%20Opinion.pdf

[30] Environment Agency. (2024). 'Flood Map for Planning (Rivers and Sea) – Flood Storage Areas'. Available at: https://www.data.gov.uk/dataset/cae4e24c-0342-48aa-8a93-d727ce582b3c/flood-map-for-planning-rivers-and-sea-flood-storage-areas

[31] Cory Environmental Holdings Limited. (2023). 'Environment Impact Assessment Scoping Report: Cory Decarbonisation Project'. Available at: https://infrastructure.planninginspectorate.gov.uk/wpcontent/ipc/uploads/projects/EN010128/EN010128-000021-EN010128%20-%20Scoping%20Report.pdf

[32] Cory Environmental Holdings Limited. (2023). 'Preliminary Environmental Information Report: Cory Decarbonisation Project'. Available at: https://corydecarbonisation.co.uk/document-library/

[33] Environment Agency. (2024). 'Flood Maps for Planning'. Available at: https://flood-map-for-planning.service.gov.uk/

[34] Environment Agency. (2024). 'Long Term Flood Risk'. Available at: https://check-long-term-flood-risk.service.gov.uk/map

[35] Environment Agency. (2024). 'Risk of Flooding from Reservoirs – Maximum Flood Extent'. Available at: https://www.data.gov.uk/dataset/44b9df6e-c1d4-40e9-98eb-bb3698ecb076/risk-of-flooding-from-reservoirs-maximum-flood-extent-web-mapping-service#:~:text=The%20Reservoir%20Flood%20Map%20Maximum,release%20the%20water%20it%20holds.

[36] Environment Agency. (2024). 'Recording Flood Outlines'. Available at: https://data.gov.uk/dataset/16e32c53-35a6-4d54-a111-ca09031eaaaf/recorded-floodoutlines

[37] Environment Agency. (2024). 'Catchment Data Explorer'. Available at: https://environment.data.gov.uk/catchment-planning

[38] Environment Agency. (2022). 'Thames River Basin District River Basin Management Plan: Updated 2022'. Available at: Thames river basin district river basin management plan: updated 2022 - GOV.UK (www.gov.uk)

[39] Ordinance Survey. (2024). 'OS Maps'. Available at: https://osmaps.ordnancesurvey.co.uk

[40] Environment Agency. (2024). 'Survey Data Download'. Retrieved from: https://environment.data.gov.uk/DefraDataDownload/?Mode=survey

[41] DEFRA. (2024). Magic Online Mapping. Available at: https://magic.defra.gov.uk/MagicMap.aspx

[42] British Geological Survey (BGS). (2024). 'Geology of Britain Viewer'. Available at: https://mapapps2.bgs.ac.uk/geoindex/home.html

[43] [43] British Geological Survey (BGS). (2024). 'Geological Map Sheet 257 and Sheet 271'. Available at: https://webapps.bgs.ac.uk/data/MapsPortal/series.html?collection=PMAP&series=E50k

[44] WSP. (2017). 'Riverside Data Centre Ground Investigation Report'.

[45] GDG. (2021). 'Geotechnical Interpretive Report and Contaminated Land Report 21083-R-002-02'.

[46] Groundsure (2023). 'Report for Proposed Scheme'.

[47] National Library of Scotland. (2024). 'Map Images'. Available at: https://maps.nls.uk/

[48] Centre For Ecology and Hydrology. (2024). 'Flood Estimation Handbook Web Service'. Available at: https://fehweb.ceh.ac.uk/GB/map

[49] Cory Environmental Holdings Limited. (2018). 'Environmental Statement Chapter 12: Hydrology, Flood Risk and Water Resources'. Available at: https://infrastructure.planninginspectorate.gov.uk/wpcontent/ipc/uploads/projects/EN010093/EN010093-000227-6.1%20ES%20Chapter%2012%20Hydrology%20Flood%20Risk%20and%20Water%20Resources.pdf

[50] Cory Environmental Holdings Limited. (2007). 'Riverside Resource Recovery Facility Tidal Flood Risk Assessment'.

[51] Environment Agency. (2008). 'Thames Estuary 2100 In-channel Extreme Water Levels'.

[52] Environment Agency. (2018). 'Thames Estuary Breach Assessment'.

[53] Environment Agency. (2020). 'Marsh Dykes Model'.

[54] Port of London Authority. (2022). 'Bathymetric data requested in June 2022'.

[55] Navico Group. (2023). 'C-Map'. Available at: https://www.c-map.com/en-gb/home/

[56] UK Hydrographic Office. (2023). 'TotalTide software'.

[57] Google Earth. (2024). 'Google Earth'. Available at: https://earth.google.com/web/

[58] Environment Agency. (2024). 'Ecology and Fish Data Explorer'. Available at: https://defra-ecology-prod.publishmydata.com/ecology-fish/

[59] Environment Agency. (2024). 'Water Quality Archive'. Available at: https://environment.data.gov.uk/water-quality/view/download/new

[60] Foundation for Water Research. (1993). 'A Framework for Marine and Estuarine Model Specification in the UK'.

[61] Environment Agency. (2023). 'Sea level at Erith Deep Wharf'. Available at: https://check-for-flooding.service.gov.uk/station/9154

[62] Design Manual for Roads and Bridges. (2020). 'LA 113 Road Drainage and the Water Environment, Revision 1'. Available at: https://standardsforhighways.co.uk/tses/attachments/d6388f5f-2694-4986-ac46-b17b62c21727?inline=true

[63] Design Manual for Roads and Bridges. (2020). 'LA 104 Environmental Assessment and Monitoring, Revision 1'. Available at: https://www.standardsforhighways.co.uk/tses/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a?inline=true

[64] Thames Water Utilities Limited. (2023). 'Thames Water Resources Management Plan'. Available at: https://thames-wrmp.co.uk/document-library/

[65] Environment Agency. (2019). 'What is the Risk of Flooding from Surface Water Map'. Available at:

https://assets.publishing.service.gov.uk/media/5db6ded540f0b6379a7acbb8/What-is-the-Risk-of-Flooding-from-Surface-Water-Map.pdf

[66] Cory Environmental Holdings Limited. (2021). 'Riverside Energy Park: Surface and Foul Water Drainage Design Strategy In accordance with Requirement 9, Schedule 2, of the Riverside Energy Park Order (2020), as amended'.

[67] Cory Environmental Holdings Limited. (2018). 'Riverside Energy Park: Chapter 12 Hydrology, Flood Risk and Water Resources'. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010093/EN010093-000424-Cory%20Environmental%20Holdings%20Limited%20-%206.1%20ES%20Chapter%2012%20Hydrology,%20Flood%20Risk%20Water%20Resources%20(Rev%201).pdf

[68] Cory Environmental Holdings Limited. (2018). 'Riverside Energy Park: Flood Risk Assessment'. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010093/EN010093-000211-5.2%20Flood%20Risk%20Assessment.pdf

[69] Environment Agency. (2022). 'Flood Risk Assessments: Climate Change Allowances'. Available at: Flood risk assessments: climate change allowances - GOV.UK (www.gov.uk)

[70] Environment Agency. (2023). 'Thames Estuary 2100'. Available at: https://www.gov.uk/government/collections/thames-estuary-2100-te2100

[71] CIRIA. (2001). 'Control of Water Pollution from Construction Sites (C532)'.

[72] Environment Agency. (2018). 'The Environment Agency's Approach to Groundwater Protection'. Available at: https://assets.publishing.service.gov.uk/media/5ab38864e5274a3dc898e29b/Environment-Agency-approach-to-groundwater-protection.pdf

[73] UK Government. (2002). 'The dangerous Substances and Explosive Atmosphere Regulations 2002'. Available at: https://www.legislation.gov.uk/uksi/2002/2776/contents/made

[74] Health and Safety Executive. (2015). 'HSG140: Safe use and handling of flammable liquids'. Available at: https://www.hse.gov.uk/pubns/priced/hsg140.pdf

[75] Health and Safety Executive. (2013). 'Control of Substances Hazardous to Health'. Available at: https://www.hse.gov.uk/pubns/priced/l5.pdf

[76] CIRIA. (1997). 'R164: Design of containment systems for the prevention of water pollution from industrial incidents'. Available at: https://www.ciria.org/CIRIA/Resources/Free_publications/containment_systems.aspx

[77] HM Government. (1981). 'The Dangerous Substances (Conveyance by Road in Road Tankers and Tank Containers) Regulations 1981'. Available at: https://www.legislation.gov.uk/uksi/1981/1059/made

[78] United Nations. (2023). 'Agreement concerning the International Carriage of Dangerous Goods by Road'.

[79] Health and Safety Executive. (2013). 'Dangerous Substances and Explosive Atmospheres Regulations 2002'. Available at: https://www.hse.gov.uk/pubns/priced/l138.pdf

[80] Health and Safety Executive. (2023). 'Control of Substances Hazardous to Health'. Available at: https://www.hse.gov.uk/coshh/

[81] Health and Safety Executive. (2023). 'Control of Major Accident Hazards'. Available at: https://www.hse.gov.uk/comah/

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