Preliminary Environmental Information Report Volume 1

Chapter 12 Hydrology, Hydrogeology and Drainage

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LIONLINK

Contents

Glossary of Project Terminology

This Glossary has been provided to define terms used across a number of the LionLink Proposed Scheme documents. Terms and abbreviations contained herein are provided at the end of the document in the **Topic Glossary and Abbreviations.**

Term	Description
Amendment to Kiln Lane Substation Scenario	The scenario where the Proposed Scheme will comprise the amendments to Kiln Lane Substation that would be required if Kiln Lane Substation was built out pursuant to the EA1N/EA2 DCOs.
Applicant, the	National Grid Lion Link Limited (NGLLL)
Bellmouth	A flared vehicular access/egress point connecting permanent route to the public highway.
Converter Station	A converter station changes electricity between High Voltage Alternating Current (HVAC), which power our homes, and High Voltage Direct Current (HVDC) which is more efficient for transporting electricity over long distances and vice versa. The proposed Converter Station is located to the east of Saxmundham.
Converter Station Site	The Converter Station Site as a whole, allowing for the co-location of the Converter Station with the Converter Station being separately consented as part of the Sea Link project.
Co-ordination	The process of people or entities working together.
Co-location	Where different elements of a project, or various projects, are located in one place.
Construction Compound	Temporary compounds installed during the construction phase of the Proposed Scheme. Each compound is likely to contain storage areas such as laydown areas, soils storage, and areas for equipment and fuel, drainage, generators, car parking and offices and welfare areas (portacabins).
Development Consent Order (DCO)	An order made by the Secretary of State pursuant to the Planning Act 2008 (as amended) granting development consent for a Nationally Significant Infrastructure Project. It grants consent to develop the approved project and may include (among other things) powers to compulsorily acquire land and rights where required and deemed marine licences for any offshore works.
Draft Order Limits	The area of land identified as being subject to the DCO application. The Draft Order Limits are made up of the land required both temporarily and permanently to allow for the construction, operation and maintenance, and decommissioning of the Proposed Scheme. All onshore parts of the Proposed Onshore Scheme are located within England and offshore parts of the Proposed Offshore Scheme are located within English territorial waters to 12 Nautical Miles and then up to the United Kingdom (UK) Exclusive Economic Zone (EEZ) boundary at sea.

Term	Description
Dutch Offshore Components	Is the term used when referring to the offshore elements of the Project within Dutch waters.
Eastern Route Option	As part of the Underground HVDC cable corridor, the Eastern Route Option would facilitate a degree of co-location with the Sizewell Link Road (SLR) scheme.
Environmental Impact Assessment (EIA)	The EIA is a systematic regulatory process that assesses the potential likely significant effects of a proposed project or development on the environment.
EIA Scoping Report	An EIA scoping report defines the proposed scope and methodology of the EIA process for a particular project or development. The EIA Scoping Report for the Proposed Scheme was submitted to the Planning Inspectorate with a request for the Secretary of State to adopt a scoping opinion in relation to the Proposed Scheme on 6 March 2024.
Environmental Statement (ES)	The ES is a document that sets out the likely significant effects of the project on the environment. The ES is the main output from the EIA process. The ES is published as part of the DCO application.
Exclusive Economic Zone (EEZ)	The zone in which the coastal state exercises the rights under Part V of the United Nations Convention on the Law of the Sea. These rights relate principally to the water column and may extend to 200 nautical miles from baselines. This is distinct from territorial waters, which for the UK extend 12 nautical miles from the coast.
Full Build Out of Kiln Lane Substation Scenario	The scenario if the Proposed Scheme was brought forward first, then it would be responsible for developing Kiln Lane Substation for the Proposed Scheme, with sufficient additional capacity for other projects.
Joint Bay	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Kiln Lane Substation	The proposed connection point for the Project to the British National Electricity Transmission System, located to the north of Friston. Formerly known as Friston Substation. The new name has recently been adopted by NGET. The substation is of the same footprint and in the same location. Friston Substation will, hereafter, be referred to as Kiln Lane Substation.
Landfall	The proposed Landfall is where the proposed offshore HVDC Submarine Cables are brought ashore and meets with the onshore proposed Underground HVDC Cables. This includes the Transition Joint Bay (TJB). The proposed Landfall will be located at Walberswick, and there will be no permanent above ground infrastructure at the proposed Landfall.
Landfall Site	The area where the Landfall may be located.
Limit of Deviation	A maximum distance or measurement of variation within which the works must be constructed. These are lateral (i.e. on the ground) and vertical limits (in relation to height).

Term	Description
Link Box Chamber	Link boxes are used at joint bays to facilitate grounding connections to ensure safety and enable maintenance. Link boxes can either be installed below ground, in a link box chamber, or in an above ground link pillar
Multi-purpose interconnector (MPI)	A project where GB interconnection is combined with transmission of offshore generation within GB (and optionally within a connecting state).
National Grid Electricity Distribution (NGED)	The local distribution network operator for the Midlands, the southwest of England and south Wales.
National Grid Electricity Transmission (NGET)	Operators of the national electricity transmission network across Great Britain and own and maintain the network in England and Wales, providing electricity supplies from generating stations to local distribution companies. National Grid does not distribute electricity to individual premises, but its role in the wholesale market is vital to ensuring a reliable, secure and quality supply to all.
National Grid Lion Link Limited (NGLLL)	The Applicant, a joint venture between National Grid Ventures and TenneT. NGLLL is a business within the wider National Grid Ventures portfolio.
National Grid Strategic Infrastructure (NGSI)	Part of NGET and responsible for delivering major strategic UK electricity transmission projects, focussed on connecting more clean, low-carbon power to England and Wales.
National Grid Ventures (NGV)	Operates and invests in energy projects, technologies and partnerships to accelerate the development of a clean energy future. This includes interconnectors (such as the LionLink Project), allowing trade between energy markets and the efficient use of renewable energy resources.
Nationally Significant Infrastructure Projects (NSIP)	Major infrastructure developments in England and Wales for which development consent is required, as defined within Section 14 of the Planning Act 2008 (as amended). This includes any development which is subject to a direction by the relevant Secretary of State pursuant to Section 35 of the Planning Act 2008.
Non-standard interconnector (NSI)	A project where GB interconnection is combined with transmission of offshore generation outside of GB.
Northern Route Option	A northern cable corridor option that would allow Underground HVAC Cable delivery for Proposed Scheme only.
Offshore Hybrid Asset (OHA)	A project that combines cross-border interconnection with the transmission of offshore generation, this is an overarching term which covers both multi-purpose interconnectors (MPI) and non-standard interconnectors (NSI).
Order Limits	The maximum extent of land within which the Proposed Scheme may take place, as consented.
Outline Offshore Construction	Describes the control measures and standards proposed to be implemented to provide a consistent approach to the environmental

Term	Description
Environmental Management Plan (Outline Offshore CEMP)	management of the construction activities of the Proposed Offshore Scheme.
Outline Onshore Code of Construction Practice (Outline Onshore CoCP)	Describes the control measures and standards proposed to be implemented to provide a consistent approach to the environmental management of the construction activities of the Proposed Onshore Scheme.
Overhead Lines (OHL)	Conductors (wires) carrying electric current, strung from Tower to Tower.
Planning Act 2008	The Planning Act 2008 being the relevant primary legislation for national infrastructure planning.
Planning Inspectorate (PINS)	The Planning inspectorate review DCO applications and make a recommendation to the Secretary of State, who will then decide whether to approve the DCO.
Preliminary Environmental Information Report (PEIR)	The PEIR is a document, compiled by the Applicant, which presents preliminary environmental information, as part of the statutory consultation process. This is defined by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 as containing information which "is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development (and of any associated development)" (Section 12 2. (b)). This PEIR describes the Proposed Scheme, sets out preliminary findings of the EIA undertaken to date, and the mitigation measures proposed to reduce effects. The PEIR is published at Statutory Consultation stage for information and feedback.
Project (the)	The LionLink Project (hereafter referred to as the 'Project') is a proposal by National Grid Lion Link Limited (NGLLL) and TenneT. The Project is a proposed electricity link between Great Britain (GB) and the Netherlands with a capacity of up to 2.0 gigawatts (GW) of electricity and will connect to Dutch offshore wind via an offshore platform in Dutch waters. The Project is the collective term used to refer to the proposal for all aspects (onshore and offshore) of the proposed interconnector between GB and the Netherlands.
Proposed Offshore Scheme	The term used when referring to the offshore elements of the Proposed Scheme, seaward of the mean high-water springs to the EEZ boundary at sea.
Proposed Onshore Scheme	The term used when referring to the onshore elements of the Proposed Scheme, landward of the mean low water springs. Proposed Onshore Scheme components include: a) Kiln Lane Substation. b) Underground High Voltage Alternating Current (HVAC) Cables; c) Converter Station.

Term	Description
	d) Underground High Voltage Direct Current (HVDC) Cables; and e) Landfall.
Proposed Scheme	Used when referring to the GB scheme components of the Project, not including Dutch components. This includes both the onshore and offshore scheme components which are within UK territorial waters and up to the UK EEZ boundary at sea.
Rochdale Envelope	The Rochdale Envelope or Design Envelope approach is employed where the nature of a proposed development means that some details of a project are not available in advance of, or at the time of submitting the DCO application. The Rochdale Envelope approach defines a design envelope and parameters within which the final design will sit and ensures a robust and reliable EIA can be undertaken.
Scoping Opinion	A scoping opinion is requested from the Planning Inspectorate on behalf of the Secretary of State, to inform the requirements of EIA process and ultimately the ES which will be submitted as part of the application for development consent. Through the scoping process, the views of the statutory consultees and other relevant organisations on the proposed scope of the EIA are sought. A Scoping Opinion for the Proposed Scheme was issued by the Planning Inspectorate (on behalf of the Secretary of State) on 16 April 2024. The Applicant received a separate EIA Scoping Opinion from the Marine Management Organisation (MMO) (Reference DCO/2024/00005, dated 04 September 2024) as the MMO were unable to provide opinion to the Planning Inspectorate in time for the April 2024 deadline.
Scottish Power Renewables (SPR) East Anglia One North (EA1N) and East Anglia 2 (EA2) Consents (SPR EA1N and EA2 Consents)	The Orders made following the Scottish Power Renewables applications for development consent for the following projects: a) The East Anglia ONE North Offshore Wind Farm Order 2022; and b) East Anglia TWO Offshore Wind Farm Order 2022
Southern Route Option	A southern cable corridor option that would allow: a) Underground HVAC Cable delivery for Proposed Scheme only, or b) Underground HVAC Cable delivery for Proposed Scheme and ducting for Sea Links Underground HVAC and HVDC cables in that section.
Statutory Consultation	Consultation undertaken with the community and stakeholders in advance of the application for development consent being submitted to the Planning Inspectorate, on behalf of the Secretary of state, in accordance with the PA 2008.
Substation	Substations are used to control the flow of power through the electricity system. They are also used to change (or transform) the

Term	Description
	voltage from a higher to lower voltage to allow it to be transmitted to local homes and businesses.
TenneT	Operator of the electricity transmission network across the Netherlands.
Tower	A structure used to carry overhead electrical conductors, insulators, and fittings. Often described as a pylon.
Transition Joint Bay (TJB)	An underground structure at the Landfall Site that house the joints between the offshore cables and the onshore cables.
Underground Cable Corridors	Collective term for the corridors within which HVAC and HVDC cables are planned.
Underground High Voltage Alternating Current (HVAC) Cable Corridor	A corridor in which the underground HVAC cables are planned to be installed.
Underground High Voltage Alternating Current (HVAC) Cables	Transmission cables which connect between the Converter Station and Substation. HVAC cables are designed to manage fluctuating flow of current.
Underground High Voltage Direct Current (HVDC) Cable Corridor	A corridor in which the underground HVDC cables are planned to be installed.
Underground High Voltage Direct Current (HVDC) Cables	Transmission cables which connect the Converter Station to the Landfall Site and then offshore. HVDC cables are designed to manage current flowing in one direction.
Visibility Splay	An area of land at a road junction that ensures drivers have an unobstructed view of oncoming traffic allowing them to safely join or cross the road.
Western Route Option	As part of the Underground HVDC cable corridor, the Western Route Option would deliver the Scheme within its own corridor with no co-location with the Sizewell Link Road (SLR) scheme.

12 Hydrology, Hydrogeology and Drainage

12.1 Introduction

12.1.1 This chapter provides a preliminary assessment of the potential likely significant effects in relation to the Hydrology, Hydrogeology and Drainage from the construction, operation and maintenance, and decommissioning of the LionLink (hereafter referred to as 'the Proposed Onshore Scheme').

12.1.2 This chapter outlines legislation, policy and guidance that is relevant to Hydrology, Hydrogeology and Drainage, summarises the engagement undertaken to date, sets out the scope and methodology of assessment, and describes the baseline environment. Following this, the likely significant effects of the Proposed Onshore Scheme on Hydrology, Hydrogeology and Drainage are assessed taking account of mitigation measures within the design and control measures. The need for any additional mitigation is then considered along with any proposals for monitoring and/or enhancement. The chapter concludes with a summary of residual effects.

12.1.3 Hydrology, Hydrogeology and Drainage aspects considered within this chapter for the Proposed Onshore Scheme are:

a. compliance with the Water Environment Regulations (WER)/Water Framework Directive (WFD)[1];
b. surface water;
c. groundwater;
d. water dependent terrestrial ecosystems (WDTE);
e. water resources; and
f. flood risk and drainage.

12.1.4 This chapter should be read in conjunction with **Chapter 2 Description of the Proposed Scheme** of this Preliminary Environmental Information Report (PEIR), which describes the development parameters against which the effects considered in this chapter have been assessed and **Chapter 5 Approach and Methodology** which describes the approach to the preliminary Environmental Impact Assessment (EIA) including the approach to the assessment scenarios considered.

12.1.5 In addition, there may be interrelationships related to the potential effects on Hydrology, Hydrogeology and Drainage and other disciplines. Therefore, this chapter should be read alongside relevant parts of other chapters; namely:

[1] The Water Environment Regulations 2017 transpose the Water Framework Directive into UK law. Both WER and WFD terminology are widely utilised, but are referring to the same regulations.

a. **Chapter 8 Ecology and Biodiversity** of this PEIR – which covers designated and non-designated sites that may be dependent on surface water or groundwater, or could be impacted by changes to the water environment;
b. **Chapter 9 Geology and Contamination** of this PEIR – which covers the further detail on the geological baseline and impacts from contaminated land on controlled waters;
c. **Chapter 18 Marine Physical Environment** of this PEIR – which covers risks associated with coastal erosion, and includes the Offshore Water Framework Directive (WFD) assessment (**Appendix 18.2**); and
d. **Chapter 27 Climate Change and Carbon** of this PEIR – which covers climate change impacts.

12.1.6 This chapter is supported by the following appendices and figures:

a. **Appendix 12.1 Preliminary Flood Risk Assessment (FRA);**
b. **Appendix 12.2 Preliminary Onshore WER Compliance Assessment;**
c. **Appendix 12.3 Preliminary Hydrogeological Impact Assessment;**
d. **Appendix 12.4 Preliminary Water Cycle Study;**
e. **Figure 12.1 Surface Water Features;**
f. **Figure 12.2 Groundwater Features;**
g. **Figure 12.3 WER Surface Water Bodies;**
h. **Figure 12.4 WER Groundwater Bodies;**
i. **Figure 12.5 Risk of Flooding from Surface Water (Pluvial Flooding);**
j. **Figure 12.6 Risk of Flooding from Rivers and Seas (Fluvial Flooding);**
k. **Figure 12.7 Susceptibility to Groundwater Flooding;**
l. **Figure 12.8 WER Surface Water Bodies – watercourse naming; and**
m. **Figure 12.9 Groundwater Vulnerability.**

12.2 Legislation, and policy framework

12.2.1 This section identifies the legislation, policy and guidance that has informed the assessment of the likely significant effects on Hydrology, Hydrogeology and Drainage.

12.2.2 **Table 12.1** lists the legislation relevant to the assessment of the likely significant effects on Hydrology, Hydrogeology and Drainage.

Table 12.1: List of relevant legislation for Hydrology, Hydrogeology and Drainage

Legislation	Relevance to assessment
Environment Act 2021 (Ref 1)	The Environment Act 2021 includes an obligation on Government to set binding targets on air and water quality, biodiversity and resource efficiency and waste reduction. The Proposed Onshore Scheme could impact water quality. The Environment Act 2021 requires an assessment to understand the potential effect on water quality and to mitigate any likely significant effects.

Legislation	Relevance to assessment
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 2)	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, transpose into English and Welsh law the Water Framework Directive 2000/60/EC and contain provisions to protect rivers, lakes, estuaries, coastal waters and groundwater. These regulations provide for protection of all types of water bodies and include environmental objectives and compliance parameters to be assessed. These requirements underpin the impact assessment for the water environment. The Proposed Onshore Scheme, shown in **Figure 1.2** of this PEIR includes protected waterbodies. This requires assessment to ensure that the Proposed Onshore Scheme does not negatively impact any protected water bodies.
Environmental Permitting (England and Wales) Regulations 2016 (Ref 3)	The Environmental Permitting (England and Wales) Regulations 2016 provide a consolidated system of environmental permitting in England and Wales. Reg 12(1) (b) states that a person must not, except under and to the extent authorised by an environmental permit, cause or knowingly permit a water discharge activity or groundwater activity. A 'water discharge activity' includes the discharge or entry to inland freshwaters, coastal waters or relevant territorial waters of any (i) poisonous, noxious or polluting matter, (ii) waste matter, or (iii) trade effluent or sewage effluent. The Proposed Onshore Scheme may require releases that would be permitted under the Environmental Permitting (England and Wales) Regulations 2016.
Environmental Damage (Prevention and Remediation) Regulations (EDPR) 2015 (Ref 4)	The EDPR 2015 require action in response to the most significant cases of damage to the environment from permitted activities, including damage to species and habitats, surface waters and groundwater.
Floods and Water Management Act 2010 (Ref 5)	The Flood and Water Management Act 2010 (FWMA) aims to improve the management of flood risk management and water resources by creating clear roles and responsibilities; it gives local authorities the role of Lead Local Flood Authority (LLFA) under which they take on the responsibility of managing flood risk on a local scale from surface water, groundwater and Ordinary Watercourses. The Environment Agency has a strategic overview of all flood risk. The FWMA provides opportunities for a comprehensive, risk-based approach on land use planning and flood risk management by local authorities and other key partners. The FWMA 2010 is relevant because the Proposed Onshore Scheme could impact upon and be affected by flood risks.

Legislation	Relevance to assessment
Eels (England and Wales) Regulations 2009 (Ref 6)	The Eels (England and Wales) Regulations 2009 apply requirements in relation to activities that may impact the passage of eels, including structures in watercourses, abstractions and discharges.
Marine and Coastal Access Act 2009 (Ref 7)	The Marine and Coastal Access Act 2009 makes provisions in relation to marine functions and activities, including provisions in relation to migratory and freshwater fish.
Water Act 2003 (Ref 8)	The Water Act 2003 amends the Water Resources Act 1991, including amendments in relation to abstraction licences (creation of temporary, transfer and full licence types).
Control of Pollution (Oil Storage) (England) Regulations 2001 (Ref 9)	The Control of Pollution (Oil Storage) (England) Regulations 2001 set minimum design standards for all new and existing above ground oil storage facilities, to reduce the risk of pollution incidents from oil.
Environment Act 1995 (Ref 10)	The Environment Act 1995 established the EA and set new standards for environmental management.
Land Drainage Act 1991 (Ref 11)	The Land Drainage Act 1991 identifies the parties responsible for the management and maintenance of land drainage including maintaining flows in watercourses. It provides relevant authorities with the powers to ensure landowners carry out works to maintain flows within watercourses and obtain the relevant consent(s) as required. The Proposed Onshore Scheme would intersect a number of watercourses, requiring consents from the relevant stakeholders.
Water Resources Act 1991 (Ref 12)	The Water Resources Act 1991 establishes regulatory controls for water abstraction, water impoundment and protection of water resources. The Proposed Onshore Scheme could impact the chemistry and biology of water bodies. This requires an assessment to understand the potential effects of the Proposed Onshore Scheme on water resources and to mitigate any likely significant effects.
Water Industry Act 1991 (Ref 13)	The Water Industry Act 1991 outlines the duties of water companies with respect to water supply and sewerage.
Environment Protection Act 1990 (Ref 14)	The Environmental Protection Act 1990 defines the fundamental structure and authority for waste management and control of emissions into the environment.
Salmon and Freshwater Fisheries Act (SFFA) 1975 (Ref 15)	The SFFA Act 1975 aims to protect migration routes and ensure correct licensing and approvals are obtained for works that could impact habitats.

12.2.3 Under the Water Act and Environmental Permitting Regulations (EPR), consents may be required from the Environment Agency for temporary construction abstractions and discharges, together with operational discharges, unless exemptions apply or where abstraction rates are less than 20m^3/d.

12.2.4 Under the EPRs, a Flood Risk Activity Permit (FRAP) is required if a regulated activity is to be undertaken on or near a main river, on or near a flood defence structure or in a floodplain.

12.2.5 Land drainage consent is required from the LLFA, or in some cases the Internal Drainage Board (IDB), for works in relation to Ordinary Watercourses[2] under The Floods and Water Management Act 2010 and Land Drainage Act 1991.

National Policy

12.2.6 The primary policy consideration for the Secretary of State when deciding whether to grant a Development Consent Order (DCO) for the Proposed Scheme will be the National Policy Statements (NPSs) for Energy. Of specific relevance to the Proposed Scheme are the Overarching National Policy Statement for Energy (NPS EN-1) (Ref 16), and the NPS for Electricity Networks Infrastructure (EN-5) (Ref 17). The National Planning Policy Framework (NPPF) (Ref 18) is also considered in the decision-making process. This sets out policies to guide how applications for development consent for energy infrastructure should be decided and how the effects of such infrastructure are considered.

12.2.7 **Table 12.2** lists the paragraphs from the NPS and other national policy that are relevant to the Hydrology, Hydrogeology and Drainage assessment. It also sets out where these policy requirements are addressed within this chapter.

Table 12.2: List of relevant national policy for Hydrology, Hydrogeology and Drainage

Relevant paragraph reference	Summary of policy requirement	Where addressed in PEIR
National Policy Statement for Energy (NPS EN-1)		
Section 4.10 Climate Change Adaptation and Resilience	Applicants must consider the direct and indirect impacts of climate change when planning the location, design, build, operation and decommissioning of new energy infrastructure. This includes using appropriate guidance such as climate change allowances for flood risk assessments. Applicants should assess impacts on and from the project across a range of climate change scenarios, in line with appropriate expert advice and guidance available at the time. Applicants should demonstrate the proposals have a high level of climate	This chapter and supporting Appendices consider the existing status of, and impacts of the Proposed Onshore Scheme on water quality, water resources and physical characteristics of the water environment, taking into consideration climate change impacts. See **Chapter 27 Climate Change, Chapter 18 Marine Physical Environment** and **Appendix 12.1 Preliminary FRA** for further information.

[2] All watercourses that are not defined as main rivers by the Environment Agency.

Relevant paragraph reference	Summary of policy requirement	Where addressed in PEIR
	resilience built-in from the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario. These results should be considered alongside relevant research which is based on the climate change projections.	
Section 4.12 Pollution Control and Other Environmental Regulatory Regimes	Many projects covered by EN-1 will be subject to the EPRs. Applicants should make early contact with regulators to discuss their requirements for Environmental Permits and other consents. In Secretary of State decision making it should work on the assumption that relevant environmental regulatory regimes (including drainage, abstractions and discharges etc) will be properly applied and enforced.	As the design develops, the Applicant would engage in pre-application discussions with the National Permitting Team of the Environment Agency and other relevant stakeholders. Preliminary control measures detailed in **Section 12.7** and **Appendix 2.1 Outline Onshore Code of Construction Practice (CoCP)** include requirements of the principal contractor to apply for consents and permits, as applicable, and enforce during construction, operation and maintenance, and decommissioning.
Section 5.8 Flood Risk	A site-specific flood risk assessment should be provided where works fall in Flood Zone 2 and 3. The FRA needs to consider the risk of flooding from the project in addition to the risk of flooding to the project from all sources, taking into account climate change, across a range of climate scenarios, clearly stating the development lifetime over which the assessment has been made. The Sequential Test has to be applied and satisfied as part of site selection.	Refer to **Appendix 12.1 Preliminary FRA** of this PEIR, which considers the risk of flooding from and to the Proposed Onshore Scheme from all sources, taking into account climate change. The Sequential Test has been applied as part of design evolution as outlined in **Appendix 12.1 Preliminary FRA** and **Chapter 3 Alternatives and Design Evolution** of this PEIR.
Section 5.16 Water Quality and Resources	Where the project is 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, resources and	This chapter and appendices consider the existing status of, and impacts of the Proposed Onshore Scheme on water quality, water resources and physical characteristics of the

Relevant paragraph reference	Summary of policy requirement	Where addressed in PEIR
	physical characteristics of the water environment. Applicant should consult with relevant regulators including the Environment Agency and local authority for relevant licensing and permitting requirements.	water environment, taking into consideration climate change impacts. The Applicant is engaging with relevant regulators on the assessment, together with licensing requirements.
National Policy Statement for electricity networks infrastructure (NPS EN-5)		
Section 2.3 Climate change adaptation and resilience	Climate change is likely to increase risks to resilience of some infrastructure. The applicant should set out how vulnerable elements of the Proposed Development are to flooding, and how they have been designed to be resilient to those risks.	Refer to **Appendix 12.1 Preliminary FRA** of this PEIR, which outlines how vulnerable elements are to flooding, and how they have been designed to be resilient to those risks.
National Planning Policy Framework		
Section 14 – para.164 Meeting the challenge of climate change, flooding and coastal change	Paragraph 164 sets out that new development should be planned for in ways that avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures.	Refer to **Appendix 12.1 Preliminary FRA** of this PEIR, for climate change allowances adopted.
Section 14 – para.170 -182 Planning and flood risk	Section 14, paragraphs 170 – 182 set out detailed considerations for flood risk in terms of planning for climate change, avoiding new development in areas of inappropriate flood risk by applying a sequential, risk-based approach followed by an exception test where applicable, and ensuring that new developments are sufficiently resilient to flooding. Further details related to flood risk are provided in the supporting Planning Practice Guidance for Flood Risk and Coastal Change. It provides additional guidance on flood risk vulnerability classifications and managing residual risks in support of the NPPF. It uses	Refer to **Appendix 12.1 Preliminary FRA** of this PEIR, for detailed flood risk considerations,

Relevant paragraph reference	Summary of policy requirement	Where addressed in PEIR
	the concept of Flood Zones, areas at increased risk of flooding from other sources, vulnerability classifications and their compatibility to assess the suitability of a specific site for a certain type of development. It provides clarification on the application of the Sequential Test for all sources of flood risk, not only fluvial and coastal/tidal flooding, and where there is a need to apply the Exception Test.	
Section 15 – para.187(e) Conserving and enhancing the natural environment	Section 15, paragraph 187(e) states that new and existing development should not pose an unacceptable risk of water pollution, and that it should, wherever possible, help to improve the local environmental conditions, including water quality and actions set out in the River Basin Management Plans (RBMP)	The impact of the Proposed Onshore Scheme on surface and groundwater quality is presented in this report. The consideration of the Proposed Onshore Scheme on actions set out in the RBMP is undertaken in **Appendix 12.2 Water Environment Regulations Compliance Assessment** of this PEIR.

12.2.8 In April 2025, the Department for Energy Security and Net Zero (DESNZ) published the consultation on the revised energy NPS's, with draft updates made to NPS EN-1, NPS EN-3 and NPS EN-5. The Applicant recognises the clarifications that are proposed in the draft NPS's, including specific reference to Offshore Hybrid Asset's directed into the NSIP regime under Section 35 of the Planning Act 2008 (draft NPS EN-1 paragraph 4.2.18 and draft NPS EN-3 paragraph 1.6.3).

12.2.9 The Applicant acknowledges that the draft policy is subject to change and therefore all potentially relevant references that apply to the Proposed Scheme are not recorded within this PEIR.

12.2.10 The Applicant will continue to monitor the progress of the designation of the draft NPS's and their applicability to the Proposed Scheme, as it progresses through Statutory Consultation and towards the submission of the application for development consent.

Local policy

12.2.11 The local policies listed in **Table 12.3** are considered relevant to the Hydrology, Hydrogeology and Drainage assessment of the Proposed Onshore Scheme.

Table 12.3: List of relevant local policy for Hydrology, Hydrogeology and Drainage

Local planning authority	Relevant local policy	Relevance to assessment
East Suffolk Council (ESC)	Suffolk Coastal Local Plan (2020) Policy SCLP9.5: Flood Risk Policy SCLP9.6: Sustainable Drainage Systems Policy SCLP9.7: Holistic Water Management Policy SCLP10.3: Environmental Quality	The policies have informed the approaches to **Appendix 12.1 Preliminary FRA** and **Appendix 12.4 Water Cycle Study** of this PEIR. The drainage design for the Proposed Onshore Scheme will utilise Sustainable Drainage Systems (SuDS), with further detail presented in the ES. Preliminary mitigation measures to manage the risk to identified receptors are presented in **Section 12.7**.
ESC	Waveney Local Plan (2019) Policy WLP8.24 Flood Risk Policy WLP8.28 Sustainable Construction	The policies have informed the approaches to **Appendix 12.1 Preliminary FRA** and **Appendix 12.4 Water Cycle Study** of this PEIR. The drainage designs will utilise SuDS, with further detail presented in the ES.
Suffolk County Council (SCC)	Suffolk Local Flood Risk Management Strategy (2023) Appendix B – Policy for working on watercourses in Suffolk Appendix C – Protocol for Local Planning Authorities and developers on SuDS, surface water drainage and local flood risk in Suffolk	The policies have informed the approaches to **Appendix 12.1 Preliminary FRA** and **Appendix 12.4 Water Cycle Study** of this PEIR. The drainage design for the Proposed Onshore Scheme will utilise SuDS, with further detail presented in the ES. Appropriate consents will be obtained for any works on watercourses that are crossed by the Proposed Onshore Scheme.

12.3 Consultation and engagement

12.3.1 This section describes the outcome of, and response to, the Environmental Impact Assessment (EIA) Scoping Opinion (Ref 19) in relation to the Hydrology, Hydrogeology and Drainage assessment.

12.3.2 It also provides details of the ongoing technical engagement that has been undertaken with key stakeholders and provides a brief overview of the non-statutory public consultation undertaken to date.

12.3.3 Feedback from engagement and consultation are used to define the assessment approach and to ensure that appropriate baseline information is used.

12.3.4 It should be noted that feedback is also used to drive the design of the Proposed Onshore Scheme to avoid, prevent and reduce any likely environmental effects. **Chapter 3 Alternatives and Design Evolution** of this PEIR reports how the Proposed Onshore Scheme design has evolved in response to feedback. Details of proposed embedded design (Primary) mitigation and standard good practice (Tertiary) control measures relevant to the Hydrology, Hydrogeology and Drainage assessment are provided in **Section 12.7** of this chapter.

Consultation

Non-Statutory Consultation

12.3.5 Feedback received from stakeholders during the Non-Statutory Consultation in 2022 and 2023 is outlined within the **Interim Non-Statutory Consultation Feedback Summary Report 2023** (Ref 20) and **Supplementary Non-Statutory Consultation Summary Report 2024** (Ref 21).

12.3.6 Responses relating to Hydrology, Hydrogeology and Drainage were received from a number of consultees including the following:

a. Environment Agency;
b. East Suffolk Water Management Board;
c. Suffolk County Council (SCC);
d. East Suffolk Council (ESC); and
e. Parish and Town Councils: Friston Parish Council and Walberswick Parish Council.

12.3.7 **Table 12.4** includes a summary of key non-statutory consultation feedback received to date and how this has been addressed within the PEIR or will be within the ES. All feedback received has been considered as part of the ongoing EIA.

Table 12.4: Key non-statutory consultation feedback for Hydrology, Hydrogeology and Drainage

Stakeholder	Comment	Applicant response
Environment Agency	**Groundwater** There is a licenced abstraction at TM4800077180. The cable route encroaches on Source Protection Zone (SPZ) 1 for this abstraction. We recommend avoiding SPZ1 to 3 for route selection as it minimises risk to the water environment. The cable route options between Saxmundham, Thorpness and Dunwich cross a SPZ3, which seems unavoidable. However abstractions at TM4377060830 are avoidable, and one of the proposed cable routes encroaches on SPZ2 just south of Coldfriar Green. We recommend this constraint is avoided as it minimises risk to the water environment.	**Groundwater** The Draft Order Limits have been refined to avoid SPZ1 and SPZ2. Design evolution has been described in **Chapter 3 Alternatives and Design Evolution** of this PEIR, and embedded mitigation is described in **Section 12.7**.
Environment Agency	**Flood Risk** Our maps show part of the cable search area lies within fluvial/ tidal Flood Zone 3a and 2 defined by the 'Planning Practice Guidance: Flood Risk and Coastal Change' as having a high/medium probability of flooding. The majority of the search area lies within Flood Zone 1, low probability of flooding. The proposal is for an interconnector, which is classified as 'Essential Infrastructure', as defined in Annex 3:Flood Vulnerability classification of the Planning Practice Guidance. **Main river crossings** The cable search area crosses the following main rivers: • Buss Creek; • River Blyth (Tidal); • Dunwich River; • Minsmere River and Tributaries; • Theberton Watercourse; • Thorpeness 100 and Tributaries; and • Tributary of River Alde, Friston.	**Flood Risk** See **Appendix 12.1 Preliminary FRA** of this PEIR. **Main river crossings** The revised Draft Order Limits now cross: • River Fromus; • Minsmere Old River; • Hundred River; and • Dunwich River. The River Fromus is crossed by a clear span bridge, whilst the Minsmere, Dunwich

Stakeholder	Comment	Applicant response
		and Hundred Rivers are crossed by trenchless techniques.
	Environmental Permit for Flood Risk Activities Flood Risk Activity Permits would be required for all cable crossings of main rivers, and may be required for any work in, under, over or within 8 metres (m) from a fluvial main river and from any flood defence structure or culvert, or 16m from a tidal main river and from any flood defence structure or culvert.	**Environmental Permit for Flood Risk Activities** Flood Risk Activity Permits would be obtained for all relevant works.
	Flood data We would advise the applicant to obtain our Product 4 flood data for the main rivers they will be crossing, including our Coastal 2018 data.	**Flood data** The Applicant has obtained flood data as summarised in **Appendix 12.1 Preliminary FRA** of this PEIR.
	Climate Change allowances Fluvial The proposal is classed as 'essential Infrastructure', the higher central allowance should be assessed for climate change in the fluvial Flood zone 3a. Tidal The proposal is classed as essential Infrastructure, the minimum benchmark for flood risk mitigation is for it to be designed to the 'upper end' climate change allowance for the development lifetime, (including decommissioning where relevant).	**Climate Change allowances** Climate change allowances considered for flood risk are outlined in **Appendix 12.1 Preliminary FRA** of this PEIR.
	Landfall location options Option G (Walberswick) The whole of this location is within Flood Zone 3 (fluvial/tidal) and borders Dunwich River.	**Landfall location options** The landfall has been located outside Flood Zones 2 and 3.

Stakeholder	Comment	Applicant response
	Raising of ground levels & modelling If the proposal results in the raising of ground levels within Flood Zone 3, the impact upon flood risks in the local area/within the flood cell will need to be considered and compensated for appropriately. Modelling will need to be undertaken to demonstrate that there will be no increase in flood risk to the site and surrounding area.	**Raising of ground levels & modelling** No raising of ground levels within Flood Zone 3 is proposed.
	Flood warnings, mitigation measures & risks to third parties The Operator will need to register with the Environment Agency to receive flood warnings for the duration of the activities and (a) take all necessary steps, including appropriate mitigation measures, to ensure that the activities do not result in an unacceptable increase in flood risk to any third party (b) if requested by the Environment Agency, remove the structure from the watercourse within 2 hours.	**Flood warnings, mitigation measures & risks to third parties** The **Outline Onshore Code of Construction Practice (CoCP)**, **Appendix 2.1** of this PEIR, will require the Main Works Contractor to register with the Environment Agency to receive flood warnings for the duration of the activities and (a) take all necessary steps, including appropriate mitigation measures, to ensure that the activities do not result in an unacceptable increase in flood risk to any third party (b) if requested by the Environment Agency, remove the structure from the watercourse within 2 hours.
	Ordinary Watercourses Cables crossing any Ordinary Watercourses may require consent from the LLFA SCC.	**Ordinary Watercourses** Relevant consents from the LLFA or IDB will be obtained for any proposed Underground Cables crossing Ordinary Watercourses.
	Other Sources of Flooding In addition to the above flood risk, the site may be within an area at risk of flooding from surface water, reservoirs, sewer and/or groundwater. We have not considered these risks in any detail, but you should ensure these risks are all considered fully.	**Other Sources of Flooding** **Appendix 12.1 Preliminary FRA** of this PEIR considers flooding from all sources.

Stakeholder	Comment	Applicant response
Environment Agency	**Biodiversity & Ecology** **Serious Risks with Horizontal Direct Drilling (HDD) Crossings** In recent years there have been some very damaging HDD sealant breakouts from cable drilling with serious impacts on East Anglian rivers and estuaries in particular. This must be avoided in future. **Landfall location options** Option G (Walberswick) This will affect the Minsmere-Walberswick Heaths and Marshes SAC, Minsmere to Walberswick SPA and the species rich flora of the Walberswick Saltmarsh LWS as well as crossing the Dunwich River near a very popular beach and walking tourist location. The Dunwich River is connected to the important Blyth estuary downstream. Option H (Dunwich) This will cross the Minsmere-Walberswick Heaths and Marshes SAC, Minsmere to Walberswick SPA and the Minsmere river. Sites F, G and H[3] To expand on the above, these sites all cross the Minsmere river which feeds the internationally renowned Minsmere reserve. Any HDD breakout could have very serious impacts for this important internationally designated wetland. Pollution Prevention It would be beneficial in terms of the impact on the environment (both in terms of damage during construction and consistency in minimising impacts from construction) and being able to assess the proposals in	**Biodiversity & Ecology** **Serious Risks with HDD Crossings** The Outline Onshore CoCP will require the contractor to produce a breakout/frac-out management plan to reduce the risks during trenchless crossings. **Landfall location options** The Proposed Onshore Scheme Draft Order Limits have been revised to reduce interaction with sensitive sites, where feasible. Where the Proposed Onshore Scheme interacts with the designated sites and Dunwich River, trenchless crossings are to be utilised.

[3] Note sites F and H have now been discounted as part of the alternatives considered, and ongoing design of the Proposed Onshore Scheme, see **Chapter 3 Alternatives and Design Evolution** for further detail.

Stakeholder	Comment	Applicant response
	combination, to have all three projects run through the same corridor and converter station site.	
Suffolk County Council – LLFA	**Flood Risk** NPS EN-1 only references assessment of Flood Zones 2 & 3 as part of the Sequential and Exception Test. This aligned with the old National Planning Policy Framework (NPPF) which was superseded in July 2021. The current NPPF now requires 'all sources of flood risk and the current and future impacts of climate change' to be considered as part of the Sequential and Exception Tests. This is further supported by updates to the Planning Practice Guidance (PPG) for Flood Risk and Coastal Change in August 2022. As such, all sources of flood risk should be considered as part of the site selection process, with the Sequential & Exception Tests being undertaken for sites where any source of flood risk is identified. For the avoidance of doubt, SCC LLFA advise applicants to use the Environment Agency National Mapping, in the absence of site-specific modelling. When using this information, areas of high, medium, and low risk should be considered. Low risk illustrates predicted surface water flood risk for the 1% - 0.1% event. However, in the absence of modelling which accounts for the impacts of climate change, SCC LLFA recommend using the low-risk scenario as a proxy for the 1%+CC scenario. **Cable Corridor sections – drainage and flood risk** Cable corridors should include sufficient space to capture, treat, store and discharge surface water generated through construction activities. Increased runoff rates due to topsoil stripping and from haul road construction will require particular consideration, along with the associated increase in suspended sediment contained in runoff. Surface water flow routes which are intercepted by proposed cable corridors will also need to be assessed.	**Appendix 12.1 Preliminary FRA** of this PEIR has been undertaken in line with current policy and guidance, taking into account all sources of flood risk and climate change. This includes the pluvial flood risks downstream of the proposed Kiln Lane Substation The Draft Order Limits have taken into consideration spatial requirements for drainage activities including spatial requirements for appropriate control measures to control runoff and suspended solids.

Stakeholder	Comment	Applicant response
	Climate change In accordance with current national guidance, SCC LLFA expect an increase in rainfall intensity of 45% to be used for assessment of surface water drainage. **Friston sub-station**[4] The extent of works required at the Friston sub-station has not yet been determined. It is acknowledged that it will be difficult to assess the impacts of proposed works at Friston given the baseline may change between now and examination/construction of this project, due to other consented projects. However, this location is particularly sensitive in terms of surface water flood risk given the existing flood risk to downstream receptors and therefore it must be adequately assessed. SCC as LLFA would like to highlight the surface water infrastructure required for the consented National Grid Substation and Scottish Power Renewables Projects may limit the space for works to the National Grid Substation. Changes to this mitigation infrastructure should be avoided wherever possible. **Converter Station Site** An assessment of all sources of flood risk should be undertaken, including allowances for current and future climate change. Areas of surface water flood risk appear to be present within this site location. SPZ 3.	
East Suffolk Council	**Consideration of flood risk** It is noted that flood risk has been considered, but it is not clear however as to which sources this is referring to. ESC would like to highlight that consideration should be given to all sources of flooding. Evidence will need to be provided to support the project and demonstrate that flood risk has been fully considered. Please note	**Appendix 12.1 Preliminary FRA** of this PEIR considers flood risk from all sources of flooding. Private water supply (PWS) records have

[4] Referred to as Kiln Lane Substation as part of the Proposed Onshore Scheme, see **Glossary of Project Terminology**

Stakeholder	Comment	Applicant response
	regard should be had to the outputs of any published surface water management plans in addition to material published by other developers in relation to the same site. **Private Water Supplies** The developer should take measures to identify Private Water Supplies in the vicinity of works so that they can be undertaken in such a way as to prevent impact to those supplies.	been obtained within the study area as defined in **Section 12.4** of this PEIR.
East Suffolk Water Management Board	In order to avoid conflict between the planning process and the Board's regulatory regime and consenting process (as per the Land Drainage Act 1991 and the Board's Byelaws) please be aware of the following: • Where the proposals include works to alter a watercourse consent is required under Section 23 of the Land Drainage Act. If the site is within an IDD [internal drainage district] the relevant IDB is the consenting authority for these works. If outside an IDD, the County Council (Lead Local Flood Authority) is the consenting authority. • Where the proposals include works within 9m of an Arterial Watercourse, consent is required under byelaw 10. Byelaw 10 restricts works within 9 metres of drainage or flood risk infrastructure (including Adopted Watercourses), the principle aim being to ensure watercourses can be maintained by the Board now and in the future without restrictions being placed on the Board's access. • Where a surface water (or treated foul water) discharge is proposed to a watercourse within the IDD then the proposed connection will require Land Drainage Consent in line with Byelaw 3.	Consents will be obtained from the IDB for works in proximity to IDB watercourses, or discharges to IDB watercourses The Draft Order Limits intersects with catchments within the East Suffolk IDB, but does not intersect any East Suffolk IDB actively managed watercourses.
Friston Parish Council	**Flooding** Flooding, and in particular surface water flooding, is of extreme concern to the village of Friston and there has been a long history of flooding in the village, which in some instances has caused damage to properties. Any extension of the NG substation will inevitably exacerbate the situation. As noted by the ExA the effects of the proposed substation and any extensions to the north of Friston would be substantially adverse.	**Appendix 12.1** of this PEIR outlines the Flood Risk Assessment which has considered flood risk from all sources; including pluvial. The drainage at the proposed Kiln Lane Substation will follow SuDS principles and be designed to not exacerbate existing

Stakeholder	Comment	Applicant response
	EN1 requires that all sources of flooding be considered as part of site selection where the Sequential Test should be applied to all sources of flooding. NG seems to be unaware of basic policy requirements and information must be given by NG as to how the converter and substation sites have been assessed against these policies. FPC objects to the extension of the Friston connection hub and if NG is determined to go ahead with this proposal, is absolutely vital that surface water run-off is fully and properly assessed and a great degree of detail provided as to how the effects of pluvial flooding can be mitigated. Further all forms of flooding must be considered and assessed for all locations being proposed by Sea Link and Eurolink.	flood risks downstream. Opportunities for betterment will continue to be explored during design evolution, and where practicable, adopted into the design of the Proposed Onshore Scheme.
Walberswick Parish Council	The constantly changing coastline and beach at Walberswick would be another challenge for using this as a landing site. The coast is extremely unstable and susceptible to erosion and the shape and surface of the beach is in constant flux. During many regular high tides, and nearly always during high tides when the weather is poor, Walberswick's shingle and sand beach is completely submerged up to the marron grass sand dunes and the marsh that lies behind them. Even the car parking area, proposed for construction support, is highly susceptible to flooding when the sea over tops the dunes especially during winter and spring tides. Sizewell C will have no water source and will have to bring in some 40 water tankers each day from the start of construction and then will have to build a desalination plant to provide it with potable water.	Refinement of the Draft Order Limits (see **Chapter 3 Alternatives and Design Evolution**) has avoided areas of Flood Zone 2 and 3. The offshore cable connection to the proposed Landfall and coastal erosion are considered in further detail in **Chapter 18 Marine Physical Environment** of this PEIR**.**
Middleton cum Fordley Parish Council	We are very concerned about the short- and long-term impacts of trenching through any of these valuable landscapes. We fear that moving heavy construction equipment on to the wetter parts of the search area will do permanent damage by causing compaction of soft alluvial soils. These areas are already subject to flooding, as most recently seen in Storm Babet. We are concerned that major construction works could adversely affect drainage systems that are already stressed and therefore increase flood risk.	Design of the proposed Underground Cable Corridor has taken into account areas more susceptible to wet conditions (such as floodplains). These areas have been avoided during routing, or trenchless crossing have been proposed. Existing drainage would be reinstated on completion of construction works.

EIA Scoping Opinion

12.3.8 An EIA Scoping Opinion was adopted by the Planning Inspectorate on behalf of the Secretary of State on 16 April 2024.

12.3.9 Comments received from the Planning Inspectorate in relation to Hydrology, Hydrogeology, and Drainage are provided in **Table 12.5**.

Table 12.5: Preliminary response to Planning Inspectorate Scoping Opinion comments for Hydrology, Hydrogeology and Drainage

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
3.7.1	Impacts on the listed main rivers at the proposed Kiln Lane Substation, underground HVAC cable corridor and converter station sites during construction. The Scoping Report states that there are no receptors within the study area for these components that would be susceptible to impact. Paragraph 12.3.16 of the Scoping Report states that the closest water body catchment to the substation site is 400m from the Proposed Development. Paragraph 12.3.28 states that the converter station site is entirely within the Fromus river water body catchment. Paragraph 12.3.22 states that there is no main river between the substation and converter station sites but that the HVAC cable corridor is likely to cross a tributary of the River Fromus. Minor surface water features could be present in each location, but it is unclear whether these could be hydrologically linked to main rivers. It is understood that the HVAC cable corridor crosses through areas of Flood Zones 2 and 3. The Inspectorate does not consider	The scope of the assessment has been defined in **Table 12.6**. Baseline conditions are defined in **Section 12.6** and the preliminary assessment of effects has been provided in **Section 12.8.** Stakeholders (such as the Environment Agency and LLFA) are being consulted throughout the EIA process.

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
	that sufficient justification to demonstrate an absence of impact pathways has been presented for these matters to be scoped out. They should be scoped into the assessment or the ES should otherwise explain, with evidence of agreement from relevant consultation bodies, why significant effects are not likely to occur.	
3.7.2	Impacts on larger Ordinary Watercourses at the proposed Kiln Lane substation and converter station sites during construction. The Inspectorate's comments at ID 3.7.1 apply equally to this matter. This matter should be scoped into the assessment or the ES should otherwise explain, with evidence of agreement from relevant consultation bodies, why significant effects are not likely to occur.	These impacts are scoped in, and the preliminary assessment of effects has been provided in **Section 12.8.** Stakeholders (such as the Environment Agency and LLFA) are being consulted throughout the EIA process.
3.7.3	Impacts on minor watercourses and land drainage during construction. The EIA Scoping Report proposes to scope out an assessment of impacts on minor Ordinary Watercourses and land drainage during construction of the Proposed Development on the basis that control measures will be implemented to manage direct and indirect impacts and prevent significant effects. In the absence of detail about the proposed mitigation and noting the comments of the Environment Agency (Appendix 2 of this Opinion) that minor watercourses could be more sensitive to pollution, the Inspectorate does not have sufficient justification to agree to scope out this matter from assessment.	These impacts are scoped in, and the preliminary assessment of effects has been provided in **Section 12.8.** Stakeholders (such as the Environment Agency and LLFA) are being consulted throughout the EIA process. River reconnaissance surveys have been undertaken to inform the receptor value/sensitivity of a number of the water courses that may be impacted by the Proposed Onshore Scheme.

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
	The ES should provide an assessment of the likely significant effects on minor watercourses and land drainage during construction of the Proposed Development or demonstrate the absence of likely significant effects, with evidence of agreement with relevant consultation bodies.	
3.7.4	Impact of changes to surface water flows and flood risk of main rivers and larger Ordinary Watercourses during operation The EIA Scoping Report proposes to scope out this matter on the basis that land within the cable corridor will be reinstated following completion of construction works, that there will be no permanent physical disturbance of water features and implementation of an appropriate sustainable urban drainage system (SuDS). In the absence of detail about the proposed reinstatement and mitigation and noting the comments of the Environment Agency (Appendix 2 of this Opinion), the Inspectorate is not able to agree to scope out this matter from assessment at this stage. The ES should provide an assessment or demonstrate the absence of likely significant effects, with evidence of agreement with relevant consultation bodies.	These impacts are scoped in, and the preliminary assessment of effects has been provided in **Section 12.8.** Stakeholders (such as the Environment Agency and LLFA) are being consulted throughout the EIA process.
3.7.5	Impact of the release of pollutants to surface water on main rivers and larger Ordinary Watercourses during operation. The EIA Scoping Report provides limited justification for why this matter should be scoped out beyond stating that the	These impacts are scoped in, and the preliminary assessment of effects has been provided in **Section 12.8.** Stakeholders (such as the Environment Agency and LLFA) are being consulted throughout the EIA process. Operational mitigation measures would be

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
	maintenance activities would be as described for construction but on a more localised scale and that SuDS would be implemented. Noting that construction phase effects for this matter are scoped in, the Inspectorate does not have sufficient justification to agree this matter can be scoped out of the assessment at this stage. This matter should be scoped into the assessment or ES should otherwise explain, with evidence of agreement from relevant consultation bodies, why significant effects are not likely to occur. The ES should provide details of any controls that are proposed to limit the potential release of pollutants to surface water during operation of the Proposed Development, for example in an environmental management plan. Any measures should be demonstrably secured in the DCO.	secured as a requirement of the DCO at ES stage.
3.7.6	Impact of changes to groundwater flows and flood risk during operation. The EIA Scoping Report proposes to scope out this matter on the basis that the potential for impacts to groundwater flow paths (and related flood risk) from permanent below ground structures (such as piles and retaining walls) is proposed to be assessed for construction impacts and no further impacts are anticipated during operation. The Inspectorate agrees that this matter can be scoped out provided that the construction phase assessment considers the permanent changes introduced by the Proposed Development and	The construction phase assessment has considered permanent changes as a result of the Proposed Onshore Scheme, and the preliminary assessment of effects has been provided in **Section 12.8.** Mitigation measures (for preliminary measures see **Section 12.7**) would be secured as a requirement of the DCO at ES stage.

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
	that any mitigation required to avoid likely significant effects is described in the ES and demonstrably secured in the DCO.	
3.7.7	Impact of the release of pollutants to groundwater during operation The Scoping Report states that "maintenance activities are considered to be as described for construction, albeit on a more localised scale". However, impacts from release of pollutants to groundwater during construction have been scoped into the ES and the extent of potential pollution to groundwater during operation is unclear. The Inspectorate does not have sufficient justification to scope this matter out at this stage. An assessment should be provided, or the ES should otherwise explain, with evidence of agreement from relevant consultation bodies, why significant effects are not likely to occur. The ES should provide details of any controls that are proposed to limit the potential release of pollutants to groundwater during operation of the Proposed Development, for example in an environmental management plan. Any measures should be demonstrably secured in the DCO.	These impacts are scoped in, with justification presented in **Section 12.7 and 12.8** of the PEIR on how proposed embedded and good practice/control mitigation measures result in no significant effects likely to occur. **Chapter 2 Description of the Proposed Scheme** of this PEIR details maintenance activities which have been considered as part of this assessment. Stakeholders (such as the Environment Agency and LLFA) are being consulted throughout the EIA process. Mitigation measures (for preliminary measures see **Section 12.7**) would be secured as a requirement of the DCO at ES stage.
3.7.8	Impact of changes to surface water or groundwater flows and flood risk during operation. The Applicant proposes to scope out this matter on the basis that the potential for impacts to surface water and groundwater flow paths (and related flood risk) is proposed to be assessed for construction	The construction phase assessment considers permanent changes as a result of the Proposed Onshore Scheme, with justification presented in **Section 12.7 and 12.8** of the PEIR on how proposed embedded and good practice/ control mitigation measures result in no significant effects likely to occur.

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
	impacts and no further impacts are anticipated during operation. The Inspectorate agrees that this matter can be scoped out provided that the construction phase assessment considers the permanent changes introduced by the Proposed Development and that any mitigation required to avoid likely significant effects is described in the ES and demonstrably secured in the DCO.	Mitigation measures (for preliminary measures see **Section 12.7**) would be secured as a requirement of the DCO at ES stage.
3.7.9	Impact of the release of pollutants to surface water on groundwater during operation. The Scoping Report states that "maintenance activities are considered to be as described for construction, albeit on a more localised scale". However, impacts from the release of pollutants to surface water or groundwater during construction have been scoped into the ES and the extent of potential pollution to these receptors during operation is unclear. The Inspectorate does not have sufficient justification to agree to scope these matters out at this stage. An assessment should be provided, or the ES should otherwise explain, with evidence of agreement from relevant consultation bodies, why significant effects are not likely to occur. The ES should provide details of any controls that are proposed to limit the potential release of pollutants to surface and/ or groundwater during operation of the Proposed Development, for example in an environmental management plan. Any measures	These impacts are scoped in, with justification presented in **Section 12.7 and 12.8** of the PEIR on how proposed embedded and good practice/ control mitigation measures result in no significant effects are likely to occur. Stakeholders (such as the Environment Agency and LLFA) are being consulted throughout the EIA process. Mitigation measures (for preliminary measures see **Section 12.7**) would be secured as a requirement of the DCO at ES stage.

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
	should be demonstrably secured in the DCO.	
3.7.10	Flood risk to proposed onshore elements from floodplains and from the onshore elements to sensitive receptors and critical infrastructure during operation. The EIA Scoping Report seeks to scope these matters out based on them being assessed during the construction phase. However, it is also stated that there is potential for permanent infrastructure to be located within fluvial and/ or pluvial flood zones. The Inspectorate does not have sufficient justification to agree to scope these matters out of the assessment. The ES should provide an assessment of the flood risk for these matters, which should also consider changes to the future baseline arising from climate change.	The **Preliminary FRA** provided as Appendix 12.1 of the PEIR considers flood risk for the lifetime of the Proposed Onshore Scheme (construction, operation and maintenance, and decommissioning), including changes to the future baseline arising from climate change.
3.7.11	Study Area The Scoping Report states that a 500m buffer has been applied to identify key surface water and groundwater features that may be affected by the Proposed Development. However, the final study area will be reviewed following refinement of the Proposed Development's order limits. The ES should clearly define and justify the final extent of the study area with reference to the potential Zone of Influence taking into account any receptors where there is potential for hydraulic connectivity with the proposed site. Any use of professional judgement	The study area for this preliminary assessment presented in this chapter is defined in **Section 12.4.** Chapter 12 Hydrology, Hydrogeology and Drainage of the ES will justify the final study area used in the assessment, with effort made to agree the study area with relevant stakeholders.

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
	should be fully justified in the ES. Effort should also be made to agree the final study areas with relevant consultation bodies.	
3.7.12	Potential impacts on flood defences and tidal flood risk. The ES should identify the location and condition of any main river and coastal flood defences within the study area. This information should be used to inform an assessment of potential flood risk impact from damage to these defences as well as the depth of cable crossing required beneath the main river and defence assets.	The baseline **Section 12.6** of **Chapter 12 Hydrology, Hydrogeology and Drainage** of the PEIR has identified relevant flood defences and their condition within the study area. The **Preliminary FRA** provided as **Appendix 12.1** of the PEIR will consider potential flood risk impacts from damage to flood defences, together with the impact on defence assets from cable crossings.
3.7.13	Potential impacts to drainage and utilities infrastructure during construction. The ES should identify any drainage and utilities' infrastructure that may be present within the study area and provide an assessment of the potential impacts from damage to this infrastructure, where significant effects are likely to occur.	Chapter 12 Hydrology, Hydrogeology and Drainage of the ES will identify drainage and utilities that may be present within the study area. Chapter 12 Hydrology, Hydrogeology and Drainage of the ES will also consider potential impacts from damage to relevant infrastructure where significant effects are likely to occur.
3.7.14	Potential impacts from welfare facilities sewage during construction. The ES should describe how sewage from construction welfare facilities would be discharged/ managed and provide an assessment of the potential impacts to water resources, where significant effects are likely to occur.	Wastewater from construction will be considered in further detail in Chapter 12 Hydrology, Hydrogeology and Drainage of the ES. **Appendix 2.4 Water Cycle Study** of this PEIR provides initial consideration of how foul water will be managed and discharged. Any discharges from welfare facilities would be undertaken in line with the relevant permitting requirements., and measures outlined in **Appendix 2.1 Outline Onshore CoCP** of this PEIR.
3.7.15	Receptor sensitivity and magnitude of impact. The Applicant's attention is drawn	**Section 12.4** of the PEIR justifies how assessment criteria have been defined. Relevant stakeholders, such as the Environment Agency,

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
	to the Environment Agency's comments (Appendix 2 of this Scoping Opinion) regarding how assessment criteria have been defined. The ES should present a clear justification for the criterion applied and effort should be made to agree the approach with relevant consultation bodies.	are being consulted throughout the EIA process to agree the assessment methodology.
3.7.16	Flood Zone 3 Where relevant, the ES and FRA should differentiate between Flood Zones 3a and 3b in order to determine which parts of the site are located in areas considered as 'high probability of flooding' and 'functional floodplain'. The ES should include a figure to illustrate the extent of Flood Zones 3a and 3b.	Where relevant, Appendix 12.1 FRA of the ES will differentiate between Flood Zones 3a and 3b (FZ3a and FZ3b), with a figure provided to illustrate the extent of Flood Zones 3a and 3b. Above ground works within Flood Zone 3 (both 3a and 3b) will be avoided by the Scheme.
3.7.17	Surface water receptors The EIA Scoping Report indicates that minor surface water features such as ponds, ditches and drainage may be present within the proposed onshore scoping boundary area. The Applicant should ensure that all surface water features within the study area that have the potential to be significantly affected by the Proposed Development have been identified and assessed in the ES.	Surface water features that have the potential to be significantly affected by the Proposed Onshore Scheme are identified and assessed in **Chapter 12 Hydrology, Hydrogeology and Drainage** or **Chapter 8 Ecology and Biodiversity** (for ponds) of the PEIR.
3.7.18	Watercourse crossings The ES should consider the potential of proposed watercourse crossings to impact the ecological status of watercourses under the Water Framework Directive (WFD) and the results of the WFD Assessment should be reported in the ES and/ or associated Technical Appendix.	**Appendix 12.2 Water Environment Regulations (WER) Compliance Assessment** of this PEIR will consider the impacts to the ecological status of watercourses.

Scoping Opinion ID	Scoping Opinion Comment	How this is addressed
3.7.19	Water sampling The EIA Scoping Report does not refer to water sampling or analysis of existing surface water or groundwater receptors within the study area that would be undertaken to inform the assessment of effects from contaminated runoff. The Inspectorate advises that effort should be made to seek to agree the requirement and scope of water sampling and analysis with relevant consultation bodies, including the Environment Agency.	Preliminary groundwater sampling has been undertaken as part of the Ground Investigation and informed **Appendix 12.3** together with **Chapter 9 Geology and Contamination** (in relation to land contamination). The requirement for any further water sampling will be agreed with stakeholders as the design develops.
3.7.20	Private water supplies The ES should identify the location of private water supplies within the study area. This information should be used to inform the assessment of construction phase effects and identification of mitigation required to address any likely significant effects.	This data was received from the council post-submission of the EIA Scoping Report and has informed **Appendix 12.3 Hydrogeological Impact Assessment** of the PEIR and will continue inform the subsequent ES.
3.7.21	Existing flood modelling data The Applicant's attention is directed to the comments of the Environment Agency (Appendix 2 to this Opinion) with regards to additional sources of flood modelling data.	The additional sources of flood modelling data have been considered for **Chapter 12 Hydrology, Hydrogeology and Drainage** and **Appendix 12.1 Preliminary FRA** of the PEIR.

Engagement

12.3.10 This section provides details of the ongoing technical engagement that has been undertaken with stakeholders in relation to Hydrology, Hydrogeology and Drainage, and is outlined below.

Key stakeholders

12.3.11 Key stakeholders with views and concerns regarding Hydrology, Hydrogeology and Drainage have been identified as including:

a. Environment Agency;
b. SCC (as the LLFA);

c. East Suffolk IDB;
d. Essex and Suffolk Water (public water supply); and
e. Anglian Water (public sewerage undertaker).

Environment Agency engagement

12.3.12 On the 27 July 2023, an introductory meeting between the Environment Agency and the Applicant was held. An overview of the EIA Scoping Report and approach to the Hydrology, Hydrogeology and Drainage assessment at PEIR stage of the EIA was provided. The presentation covered the extent of the study area, receptors, potential impacts and design/control measures. The Environment Agency did not raise objections to the information presented.

12.3.13 Since the introductory meeting, a series of Proposed Onshore Scheme check-ins (monthly since January 2025) and technical discussions have been held to discuss impacts and agree methodologies including:

a. Groundwater monitoring;
b. Borehole decommissioning (due to planning/access constraints);
c. Flood Risk Assessment methodology; and
d. WER compliance assessment methodology.

Suffolk County Council engagement

12.3.14 On 17 April 2024, the Applicant met the LLFA in the village of Friston to undertake a walkover of the catchment, to understand the background and mechanisms to pluvial flooding issues in the area.

12.3.15 The Applicant is in the process of engaging with the stakeholder. Further detail will be reported within the subsequent ES.

East Suffolk Internal Drainage Board engagement

12.3.16 The Applicant is in the process of engaging with the stakeholder. Further detail will be reported within the subsequent ES.

Essex and Suffolk Water engagement

12.3.17 The Applicant is in the process of engaging with the stakeholder. Further detail will be reported within the subsequent ES.

Anglian Water engagement

12.3.18 The Applicant is in the process of engaging with the stakeholder. Further detail will be reported within the subsequent ES.

12.4 Assessment methodology

12.4.1 This section outlines the methodology followed to assess the potential likely significant effects of the Proposed Onshore Scheme in relation to Hydrology, Hydrogeology and Drainage including:

a. Scope of the assessment;

b. Study area;
c. Methodology; and
d. Assessment of cumulative effects;

12.4.2 This section presents a description of how receptor sensitivity, magnitude of impact and significance of effects are all described and assigned to the assessment.

12.4.3 The project-wide approach to the assessment methodology is set out in **Chapter 5 EIA Approach and Methodology** of this PEIR.

Scope of the assessment

12.4.4 Potential likely significant effects requiring assessment may be temporary or permanent and may occur during construction, operation and maintenance, and decommissioning. Potential likely significant effects on Hydrology, Hydrogeology and Drainage receptors within the scope of the assessment are summarised in **Table 12.6**. The scope of the assessment has responded to feedback received as detailed in **Section 12.3.**

Table 12.6: Summary of the scope for Hydrology, Hydrogeology and Drainage assessment

Receptor	Construction	Operation and Maintenance	Decommissioning
WER surface water bodies	Scoped In	Scoped In	Scoped In
WER groundwater bodies	Scoped In	Scoped In	Scoped In
Surface waters and dependent features	Scoped In	Scoped In	Scoped In
Groundwater and dependent features	Scoped In	Scoped In	Scoped In
WDTE	Scoped In	Scoped In	Scoped In
Flood Risk to and from the Proposed Onshore Scheme for the lifetime of the development	Scoped In	Scoped In	Scoped In

12.4.5 WDTE will be assessed to determine if and how the Proposed Onshore Scheme might impact upon them. Designated sites (such as groundwater dependent Sites of Special Scientific Interest (SSSI)) and standing water (such as pond habitats) remain ecology receptors and to avoid double-counting, the overall impacts and assessment of effects on these will be found in **Chapter 8 Ecology and Biodiversity** of this PEIR.

12.4.6 Impacts on controlled waters from contamination are assessed in **Chapter 9 Geology and Contamination** of this PEIR**.**

12.4.7 Impacts as a result of coastal erosion are assed in **Chapter 18 Marine Physical Environment** of this PEIR**.**

Study area

12.4.8 This section describes the spatial scope (the area which may be impacted) for the assessment as it applies to Hydrology, Hydrogeology and Drainage.

12.4.9 A study area of 500m from the Proposed Onshore Scheme Draft Order Limits has been considered in order to identify surface and groundwater receptors that could reasonably be affected by the Proposed Onshore Scheme, as shown in **Figure 12.1**.

12.4.10 The study area is informed by the 'source-pathway-receptor' pollutant linkage principle and was selected based on professional judgement of the potential impacts and pathways related to the Proposed Onshore Scheme. The study area will be reviewed and, as appropriate, refined as the assessment progresses, taking into account any activities which have the potential to impact water resources at greater distance (such as dewatering and discharge activities). The study area will ensure that all receptors that are potentially in hydraulic continuity with the Proposed Onshore Scheme that could be reasonably impacted are included (such as downstream receptors). Based on the assessment to date, it is considered that the 500m study area captures all receptors at risk of significant effects.

Assessment scenarios

12.4.11 **Chapter 2 Description of the Proposed Scheme, Section 2.3** of this PEIR provides a description of the Proposed Onshore Scheme, including a geographical description of the site and surroundings**. Chapter 5 EIA Approach and Methodology** of this PEIR, provides an overview of the Proposed Onshore Scheme's approach to the temporal scope (the time scales over which impacts may occur) of the EIA. This section describes the reasonable worst-case scenarios and options which have been assessed for the purposes of this Hydrology, Hydrogeology and Drainage chapter.

12.4.12 The scenarios with regards to the proposed Kiln Lane Substation considered in the EIA are described in S**ection 5.6 Assessment Scenarios and Options** of **Chapter 5** of this PEIR. This chapter has considered both Kiln Lane Substation scenarios and assesses the Full Build Out of Kiln Lane Substation Scenario as it represents a worst-case scenario due to the greater size of the study area when compared with the Amendment to the Substation Scenario.

12.4.13 Both the Northern and Southern Route options with regards to the proposed Underground High Voltage Alternating Current (HVAC) Cable Corridor have been considered in this assessment as described in **Section 5.6 Assessment**

Scenarios and Options of **Chapter 5 EIA Approach and Methodology** of this PEIR. For the HVAC Cable Southern Route Option, the HVAC Cable Route LionLink Infrastructure and ducting for Sea Link Scenario has been assessed as the worst case.

12.4.14 The location of these proposed Underground Cable Corridors is shown in **Figure 2.2**. This assessment assumes that trenching or ground disturbance may occur anywhere within the Proposed Onshore Scheme Draft Order Limits.

12.4.15 Both options with regards to the proposed Underground High Voltage Direct Current (HVDC) Cable Corridor have been assessed as described in **Section 5.6 Assessment Scenarios and Options** of **Chapter 5 EIA Approach and Methodology** of this PEIR.

12.4.16 Again, this assessment assumes that trenching may occur anywhere within the Draft Order Limits.

Baseline methodology

Data collection

12.4.17 Baseline data collection has been undertaken to obtain information over the study area. This section provides the approach to collecting baseline data.

12.4.18 The following sources of data have informed the baseline (**Table 12.7**). Further baseline sources are outlined in the relevant appendices that support this chapter.

Table 12.7: Data sources used to inform the Hydrology, Hydrogeology and Drainage assessment

Source of data	Baseline data
British Geological Survey	GeoIndex Webmap: • geological mapping (1:50,000); • hydrogeology maps; and • historical boreholes. Geological maps of the UK and continental shelf areas, East Anglia Sheet 51N, Solid Geology. Great Britain national series 1:10,000. Lexicon of named rock units. Susceptibility to groundwater flooding dataset for study area.
Defra	Multi Agency Government information for the countryside (MAGIC) Webmap: • SPZs; • aquifer designation mapping; • groundwater vulnerability mapping;

Source of data	Baseline data
	• priority habitat inventory; and • statutory and non-statutory designated sites. Hydrology data explorer: • rainfall data; • groundwater level data; and • surface water level and flow data.
East Suffolk Council	Request for Information: • Private Water Supplies within study area.
Environment Agency	Asset Information Management System (AIMS) database Catchment data explorer: • Anglian Cycle 3 RBMP 2022 and 2019 water body status classification and status objectives data; and • WER protected areas data. Data.Gov: • Groundwater Dependent Terrestrial Ecosystems (GWDTE) (England only). Ecology and fish data explorer: • freshwater biological survey datasets for invertebrates, macrophytes and diatoms; and • freshwater fish survey data. Flood map for planning. Long term flood map. Request For Information (RFI): • abstraction licences within study area; • discharge consents within study area; and • product 5 hydraulic modelling reports for the study area. Water quality data archive: • water quality data.
Geotechnics	Ground investigation data: • Proposed Underground Cable Corridor and proposed Landfall Site data obtained between January and March 2025; and • Proposed Converter Station data received October 2024. Geotechnical desk studies

12.4.19 Baseline data collection for the Hydrology, Hydrogeology and Drainage assessment has been predominantly desk based. Intrusive ground investigation was ongoing at the time of preparing this PEIR. The available data has been used to inform the assessments in this PEIR.

Site surveys

12.4.20 Site-specific ground investigation data is being obtained at the time of writing this PEIR, to provide information for the ES and detailed design of the Proposed Onshore Scheme. Available GI data used for the PEIR is presented in **Appendix 9.2 Ground Investigation Reports**.

12.4.21 Fluvial geomorphological reconnaissance walkover surveys were undertaken in April and May 2024 at crossing locations (as known in March 2024), to inform the receptor valuation. Summary results and photographs from the site visits are noted in Annex C of **Appendix 12.2 Preliminary Onshore WER Compliance Assessment** of this PEIR.

12.4.22 Reconnaissance surveys of groundwater receptors (such as abstraction licences and private water supplies) were undertaken in April 2024, to inform the assessment of impacts.

12.4.23 Surveys to inform **Chapter 8 Ecology and Biodiversity**, such as MoRPh surveys (**Appendix 8.11**) and eDNA surveys (**Appendix 8.17**), have also been considered in undertaking the WER compliance assessment.

Assessment methodology

12.4.24 The general approach to the assessment is set out in **Chapter 5 EIA Approach and Methodology** of this PEIR. This has informed the approach used in this Hydrology, Hydrogeology and Drainage assessment.

12.4.25 The methodologies for the supporting preliminary FRA and WER compliance assessment are outlined in the respective appendices; **Appendix 12.1** and **Appendix 12.2** of this PEIR.

Determining receptor value/sensitivity/importance, magnitude of impact and significance of effect

12.4.26 **Chapter 5 EIA Approach and Methodology** sets out the standard EIA methodology and matrices to be used for the assessment. The methodology is based on the principle that the environmental effects will be determined by identifying potential receptors, assigning receptor value, assessing the magnitude of change on the receptor and then identifying the significance of the effect.

Receptor value/sensitivity/importance

12.4.27 Whilst other disciplines may consider 'receptor sensitivity', receptor importance is considered here. This is because when considering the water environment, the availability of dilution means that there can be a difference between the sensitivity of a waterbody to impact, and its importance. As an example, a small drainage ditch of low conservation and biodiversity value with limited other socio-economic attributes may be very sensitive to impacts, whereas an important regional scale watercourse, may be less sensitive by virtue of its ability to assimilate discharges and physical effects. Irrespective of importance, all

controlled waters in England are protected by law from being polluted. The receptor value takes into account water resources which support human health and/or economic activity, water dependent ecosystems and vulnerability of receptors to flooding.

12.4.28 **Table 12.8** describes the receptor value/importance to be used in the assessment, in line with the definitions in **Chapter 5 EIA Approach and Methodology**, which have been adapted from existing guidance for linear infrastructure as set out in Highways England LA113 (Ref 22) and professional judgement.

Table 12.8: Receptor Importance Examples

Receptor Value - **Importance**	Summary
Very High	WER and water resources: • Watercourse having a WER classification shown in a RBMP, and within or in close hydraulic connectivity with a statutory designated site. • Principal aquifer providing regionally important resource and/or supporting a site designated under UK legislation. • Groundwater locally supports a designated GWDTE. • SPZ1. Flood Risk: • Essential infrastructure or highly vulnerable development.
High	WER and water resources: • Watercourse having a WER classification shown in a RBMP. • Principal aquifer providing locally important resource or supporting river ecosystem. • Groundwater supports a non-designated GWDTE. • SPZ2. Flood Risk: • More vulnerable development.
Medium	WER and water resources: • Watercourse not having a WER classification shown in a RBMP, but an obvious tributary of the main watercourse on the base map with flood risk extents associated with it. • Aquifer providing water for agricultural/industrial use. • SPZ3. Flood Risk: • Less vulnerable development.
Low	WER and water resources: • Unnamed minor drains and watercourses.

Receptor Value - **Importance**	Summary
	• Unproductive strata (low yield). Flood Risk • Water compatible development.
Negligible	<u>WER and water resources</u> • Watercourses with negligible/no flow during construction. • Unproductive strata (very low or no yield).

Magnitude

12.4.29 The magnitude of impact on receptors is described in **Table 12.9**, adapted from existing guidance in LA113. The magnitude of impact takes into account the likelihood of the impact occurring. The likelihood of an impact occurring is based on a scale of certain, likely or unlikely. Likelihood is considered in the case of water environment impacts only, as likelihood is inherently included within the FRA.

Table 12.9: Magnitude of impact on receptors

Magnitude	Definition
High	WFD and Water Resources: • Change in WFD Classification. • Loss or extensive impact of Public Water Supply. • Loss or extensive impact to a designated site or GWDTE. • Loss or extensive impact to major infrastructure through subsidence or similar. Flood Risk: • In the absence of modelling[5] this will be assigned based on engineering judgement, applying a precautionary principle.
Medium	WFD and Water Resources: • Contribution to change in WFD Classification. • Degradation of private water source (PWS) or loss of significant industrial/agricultural abstraction. • Impact to designated site or GWDTE. • Damage to major infrastructure through subsidence or similar. Flood Risk • In the absence of modelling this will be assigned based on engineering judgement, applying a precautionary principle.
Low	WFD and Water Resources

[5] See **Appendix 12.1** for assessment of flood risk. The Proposed Onshore Scheme will need to demonstrate no increase to flood risk to third parties, taking into consideration climate change.

Magnitude	Definition
	• Minor impacts on water supplies, watercourses and groundwater dependent features. Flood Risk • In the absence of modelling this will be assigned based on engineering judgement, applying a precautionary principle.
Negligible	WFD and Water Resources • No measurable impacts. Flood Risk • Negligible impact to peak flood levels.

Significance

12.4.30 By combining the magnitude of impact (or change) and the importance of each receptor, an assessment is made of the significance of effect, considering the possibility and nature of mitigation. The resultant effects may be either negative (adverse), positive (beneficial) or neutral, depending on the nature of the impact. The standard matrix is used for the assessment, which is provided in **Table 5.4** of **Chapter 5 EIA Approach and Methodology** of this PEIR**.**

Cumulative assessment

12.4.31 **Chapter 28 Cumulative Effects** of this PEIR defines the methodology for the assessment of cumulative effects. The Hydrology, Hydrogeology and Drainage assessment of intra- and inter-project cumulative effects will be carried out and reported within the ES.

12.4.32 The Zone of Influence for the inter-project cumulative effects assessment of Hydrology, Hydrogeology and Drainage comprises land within the Proposed Onshore Scheme Draft Order Limits, together with a buffer of 500m either side, as shown on **Figure 12.1**.

Guidance

12.4.33 In addition, the Hydrology, Hydrogeology and Drainage assessment has been undertaken in accordance with relevant guidance and has been compiled in accordance with professional standards. The guidance and standards which relate to this assessment are:

a. Construction Industry Research and Information Association (CIRIA), Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (Ref 23).
b. CIRIA, Control of Water Pollution from Linear Construction Projects – Technical Guidance (C648) (Ref 24);
c. CIRIA, Environmental good practice on site guide (fifth edition) (C811) (Ref 25);

d. CIRIA, Groundwater control: design and practice (second edition) (C750) (Ref 26);
e. CIRIA, The SuDS Manual (C753) (Ref 27);
f. Environment Agency, Cleaning the Water for All (Ref 28);
g. Environment Agency, Environmental Quality Standards Directive (EQSD) list for WFD assessments (Ref 29);
h. Environment Agency, Groundwater protection technical guidance (Ref 30);
i. Environment Agency, Hydrogeological impact appraisal for dewatering abstractions. Science Report – SC040020/SR1 (Ref 31);
j. Environment Agency, Protect groundwater and prevent groundwater pollution (Ref 32);
k. Environment Agency, Surface water pollution risk assessment for your environmental permit (Ref 33);
l. National Highways, Design Manual for Roads and Bridges (DMRB) – Sustainability and Environmental Appraisal, LA 113 Road drainage and the water environment. Revision 1 (Ref 34);
m. Planning Inspectorate, Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive (Ref 35);
n. UK Technical Advisory Group (TAG), Water Framework Directive UK Risk Assessment of GWDTE (Ref 36); and
o. Various flood risk guidance as outlined in **Appendix 12.1 Preliminary FRA.**

12.5 Assessment assumptions and limitations

12.5.1 This section provides a description of the assumptions and limitations to the Hydrology, Hydrogeology and Drainage assessment.

12.5.2 The design of the Proposed Onshore Scheme and collation of baseline data is ongoing; as such, a precautionary and conservative approach has been adopted to the assessment at this stage taking into account the design principles. The assessment will be refined in the next stage as more detailed information becomes available.

12.5.3 The current baseline understanding of the water environment within the study area has been summarised in **Section 12.6**. This understanding has been collated based on a range of publicly available data and information. The accuracy of the baseline condition assessment is reliant upon the accuracy of the data available from the sources.

12.5.4 The environmental importance of receptors, together with the magnitude of potential impacts and significance, may change during later phases as more information and data becomes available, although a reasonable worst case has been assumed in this assessment to identify likely significant effects. Should further information identify that certain receptors (such as minor watercourses) are of higher importance than assumed at this stage, the embedded design and control measures will be reviewed accordingly.

12.5.5 It is assumed that during construction, the contractor will as a minimum conform to all permit/consent/license requirements (such as temporary abstractions) and

best practice measures to avoid, reduce and minimise the risk of water pollution or unacceptable physical impacts (without mitigation) on waterbodies.

12.5.6 Following installation of the proposed Underground Cables, it is assumed that the cable trench and surface will be reinstated to a condition equivalent with existing, including reinstatement of land drainage.

12.5.7 It is assumed that any modifications of existing highway junctions will not result in any physical impacts to watercourses, where relevant.

12.6 Baseline conditions

12.6.1 To provide an assessment of the likely significant effects of the Proposed Onshore Scheme (in terms of Hydrology, Hydrogeology and Drainage), it is necessary to identify and understand the baseline conditions in the study area. This provides a reference point against which potential changes in Hydrology, Hydrogeology and Drainage can be assessed.

12.6.2 Statutory and non-statutory environmental designations are shown in **Appendix 8.1** of this PEIR.

Current baseline

Proposed Onshore Scheme

Site and surroundings

12.6.3 Refer to **Chapter 2 Description of the Proposed Scheme** for details on the Site and its surroundings.

Kiln Lane Substation

Surface Water

12.6.4 **Figure 12.1**, **Figure 12.3** and **Figure 12.8** illustrate the surface water features within the study area.

12.6.5 The Friston River is a small watercourse approximately 500m south of the Draft Order Limits that is fed by field drains in the agricultural fields to the north of Friston, in the area of the proposed Kiln Lane Substation. The river flows through the village and ultimately joins the River Alde. The Environment Agency designate the river as a main river from Church Lane in Friston southwards.

12.6.6 The Hundred River is at the eastern edge of the Draft Order Limits for the Full Build Out of Kiln Lane Substation scenario.

12.6.7 The proposed Kiln Lane Substation is not located within a WER surface water catchment.

Groundwater

12.6.8 **Figure 9.2** and **Figure 9.3** illustrate the superficial and bedrock geology respectively.

12.6.9 **Figure 12.2** and **Figure 12.4** illustrate the groundwater features within the study area.

12.6.10 The proposed Kiln Lane Substation Site overlies superficial deposits comprising the Lowestoft Formation. Over most of the area this is made up of diamicton, while the south-west of the proposed Kiln Lane Substation Site sand and gravel deposits are more likely to be present. The bedrock geology at the proposed Kiln Lane Substation Site is of the Crag Group which comprises sands, gravels, silts and clays.

12.6.11 In this area, the superficial deposits are designated a Secondary (undifferentiated) Aquifer, with the bedrock geology designated a Principal Aquifer.

12.6.12 The proposed Kiln Lane Substation is within the Waveney and East Suffolk Chalk and Crag groundwater WER catchment.

Water Dependent Terrestrial Ecosystems

12.6.13 Designated GWDTE are illustrated on **Figure 12.2**. No designated GWDTE are identified in the study area.

12.6.14 Non-designated WDTE have not been identified at this stage and will be reviewed at the ES stage based on habitat data.

Water Resources

12.6.15 The region is currently classified as a serious water stressed area by the Environment Agency, with a supply deficit.

12.6.16 The proposed Kiln Lane Substation Site falls within a Zone 3 (Total Catchment) SPZ associated with public water supply abstractions within the region (i.e., the abstraction takes place outside of the Draft Order Limits).

12.6.17 Licenced abstractions and private water supplies are illustrated in **Figure 12.1** and **Figure 12.2**. There are no licenced abstractions within 1km of the proposed Kiln Lane Substation, with the most proximal PWS being Friston House (00/00010/PWWELL) at 550m distance south.

Flood Risk

12.6.18 **Appendix 12.1 Preliminary FRA** identifies flood risk in the area of the proposed Kiln Lane Substation as follows:

a. Sea: Negligible.
b. River (Fluvial): Negligible.
c. Surface Water (Pluvial): Some parts of the area are at a high risk of flooding.
d. Groundwater: Limited potential for groundwater flooding at surface.
e. Reservoir: No risk.
f. Other sources: Risks from other sources as identified (such as from utilities) will be confirmed in the ES.

12.6.19 **Figure 12.5** and **Figure 12.6** illustrate the risk of flooding from pluvial and fluvial sources respectively. **Figure 12.7** illustrates the susceptibility to groundwater flooding.

12.6.20 Friston has a history of pluvial flood risk (Ref 37).

Proposed Underground HVAC Cable Corridor

Surface Water

12.6.21 **Figure 12.1**, **Figure 12.3** and **Figure 12.8** illustrate the surface water features within the study area.

12.6.22 The Southern Route option of the proposed Underground HVAC Cable Corridor crosses unnamed tributary of the Fromus 1. This minor watercourse becomes Sternfield drain (managed by the East Suffolk IDB) downstream of the route. No main rivers are located within the proposed Underground HVAC Cable Corridor.

12.6.23 The southeastern half of Section A (see **Figure 2.1**) towards Friston is not located within a WER surface water catchment, whilst the northwestern half is within the Fromus WER surface water catchment. See **Figure 12.8.**

Groundwater

12.6.24 **Figure 9.2** and **Figure 9.3** illustrate the superficial and bedrock geology respectively.

12.6.25 **Figure 12.2** and **Figure 12.4** illustrate the groundwater features within the study area

12.6.26 The proposed Underground HVAC Cable Corridor is almost entirely underlain by superficial deposits comprising diamicton of the Lowestoft Formation. Where the southern route crosses the tributary of the Fromus, the geology is mapped as sands and gravels of the Lowestoft Formation, and in a small area at the head of the valley; clays and silts. The bedrock geology along the proposed HVAC Cable Corridor is Crag Group which comprises sands, gravels, silts and clays.

12.6.27 In this area, the diamicton superficial deposits are designated as Secondary (undifferentiated) Aquifer, with the sands and gravels Secondary A and the clays and silts Secondary B. The bedrock geology is designated a Principal aquifer.

12.6.28 The proposed Underground HVAC Cable is within the Waveney and East Suffolk Chalk and Crag groundwater WER catchment.

Water Dependent Terrestrial Ecosystems

12.6.29 Designated GWDTE are illustrated on **Figure 12.2**. No designated GWDTE are identified in the study area of the proposed Underground HVAC Cable Corridor.

12.6.30 Non-designated WDTE have not been identified at this stage and will be reviewed at the ES stage based on habitat data.

Water Resources

12.6.31 The region is currently classified as a serious water stressed area by the Environment Agency, with a supply deficit.

12.6.32 The proposed Underground HVAC Cable Corridor falls within a Zone 3 (Total Catchment) SPZ associated with public water supply abstractions within the region (outside the Onshore Draft Order Limits).

12.6.33 Licenced abstractions and private water supplies are illustrated in **Figure 12.1** and **Figure 12.2**. A licenced abstraction is adjacent to an access road (less than 10m distance from the Draft Order Limits), south-west of the proposed Underground HVAC Cable Corridor. The licence is to abstract from the unnamed tributary of the Fromus 1 for spray irrigation. The most proximal PWS is at Friston House, as discussed in **Paragraph 12.6.17**.

Flood Risk

12.6.34 **Appendix 12.1 Preliminary FRA** identifies flood risk in the area of the proposed Underground HVAC Cable Corridor as follows:

a. Sea: Negligible.
b. River (Fluvial): Some areas (unnamed tributary of Fromus 1 crossing) at high risk of flooding.
c. Surface Water (Pluvial): Some areas at high risk of flooding.
d. Groundwater: Limited potential for groundwater flooding at surface except downstream of the proposed Underground HVAC Cable Corridor in the valley associated with the tributary of the Fromus, where there is potential for flooding of below ground structures.
e. Reservoir: No risk.
f. Other sources: Risks from other sources as identified (such as from utilities) will be confirmed in the ES.

12.6.35 **Figure 12.5** and **Figure 12.6** illustrate the risk of flooding from pluvial and fluvial sources respectively. **Figure 12.7** illustrates the susceptibility to groundwater flooding.

Proposed Converter Station

Surface Water

12.6.36 **Figure 12.1**, **Figure 12.3** and **Figure 12.8** illustrate the surface water features within the study area.

12.6.37 The Fromus lies to the west of the proposed Converter Station and will be crossed by a permanent access track. The Fromus is a WER water body and main river, with a current overall WER status of poor.

12.6.38 The proposed Converter Station is fully sited within the Fromus WER surface water catchment.

Groundwater

12.6.39 **Figure 9.2** and **Figure 9.3** illustrate the superficial and bedrock geology respectively.

12.6.40 **Figure 12.2** and **Figure 12.4** illustrate the groundwater features within the study area.

12.6.41 The proposed Converter Station Site overlies superficial deposits comprising diamicton the Lowestoft Formation. The bedrock geology at the proposed Converter Station is Crag Group which comprises sands, gravels, silts and clays.

12.6.42 In this area, the superficial deposits are designated a Secondary (undifferentiated) Aquifer, with the bedrock geology designated a Principal aquifer.

12.6.43 The proposed Converter Station is within the Waveney and East Suffolk Chalk and Crag groundwater WER catchment.

Water Dependent Terrestrial Ecosystems

12.6.44 Designated GWDTE are illustrated on **Figure 12.2**. No designated GWDTE are identified in the study area.

12.6.45 Non-designated WDTE have not been identified at this stage, and will be reviewed at the ES stage based on habitat data.

Water Resources

12.6.46 The region is currently classified as a serious water stressed area by the Environment Agency, with a supply deficit.

12.6.47 The proposed Converter Station falls within a Zone 3 (Total Catchment) SPZ associated with public water supply abstractions within the region (outside the Draft Order Limits).

12.6.48 Licenced abstractions and private water supplies are illustrated in **Figure 12.1** and **Figure 12.2**. There are no licenced abstractions or private water supplies within 500m of the Proposed Onshore Scheme.

Flood Risk

12.6.49 **Appendix 12.1 Preliminary FRA** identifies flood risk in the area of the proposed Converter Station as follows:

a. Sea: Negligible.
b. River (Fluvial): The proposed Converter Station is not within an area of fluvial flood risk, however the Fromus crossing is in an area of high flood risk.
c. Surface Water (Pluvial): Some parts of the area are at a high risk of flooding.
d. Groundwater: Limited potential for groundwater flooding at surface, except in the valley bottom of the River Fromus where there is potential for groundwater flooding to underground assets.
e. Reservoir: No risk.

f. Other sources: Risks from other sources as identified (such as from utilities) will be confirmed in the ES.

12.6.50 **Figure 12.5** and **Figure 12.6** illustrate the risk of flooding from pluvial and fluvial sources respectively. **Figure 12.7** illustrates the susceptibility to groundwater flooding.

Proposed Underground HVDC Cable Corridor

Surface Water

12.6.51 **Figure 12.1**, **Figure 12.3** and **Figure 12.8** illustrate the surface water features within the study area.

12.6.52 The proposed Underground HVDC Cable Corridor crosses multiple WER surface water catchments:

a. Fromus;
b. Hundred River;
c. Minsmere Old River; and
d. Blyth (d/s Halesworth).

12.6.53 Within the catchments, multiple watercourses will be crossed by the proposed Underground HVDC Cable Corridor:

a. Unnamed Tributary of the Hundred River 1;
b. Unnamed Tributary of the Hundred River 2;
c. Minsmere Old River;
d. Unnamed Tributary of Minsmere Old River 1;
e. Unnamed Tributary of Minsmere Old River 2;
f. Unnamed Tributary of Minsmere Old River 3;
g. Unnamed Tributary of Minsmere Old River 4;
h. Unnamed Tributary of Minsmere Old River 5; and
i. Dunwich River.

12.6.54 Minor unmapped drainage ditches would also be encountered and crossed.

Groundwater

12.6.55 **Figure 9.2** and **Figure 9.3** illustrate the superficial and bedrock geology respectively.

12.6.56 **Figure 12.2** and **Figure 12.4** illustrate the groundwater features within the study area

12.6.57 The Proposed Underground HVDC Cable Corridor overlies a range of superficial deposits, together with occasional areas of no mapped deposits. Between the main watercourses, the Lowestoft Formation is generally encountered; predominantly diamicton with discrete areas of sand and gravel or clay and silt deposits (generally in topographical lows associated with water courses). Alluvium, peat and head deposits are mapped along the proposed HVDC Cable

Corridor in association with water courses, with the peat predominantly mapped in association with the Minsmere.

12.6.58 The deposits of the Lowestoft Formation are designated Secondary aquifers (Secondary A for sand and gravel deposits, Secondary B for clay and silt deposits and Secondary (undifferentiated) for Diamicton), The head deposits are designated Secondary (undifferentiated) whilst the peat is designated unproductive (largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them).

12.6.59 The bedrock geology beneath the proposed Underground HVDC Cable Corridor is Crag Group which comprises sands, gravels, silts and clays. The bedrock is designated a Principal aquifer.

12.6.60 The proposed Underground HVDC Cable Corridor is within the Waveney and East Suffolk Chalk and Crag groundwater WER catchment.

Water Dependent Terrestrial Ecosystems

12.6.61 Designated GWDTE are illustrated on **Figure 12.2**. The Minsmere-Walberswick Heath and Marshes SSSI is within the study area of the proposed Underground HVDC Cable in the northern half of the route and is crossed, via trenchless methods, to the west of Walberswick. No designated GWDTE are identified in the study area.

12.6.62 Non-designated WDTE have not been identified at this stage, and will be reviewed at the ES stage based on habitat data.

Water Resources

12.6.63 The region is currently classified as a serious water stressed area by the Environment Agency, with a supply deficit.

12.6.64 The Sections A and B1 of the proposed Underground HVDC Cable Corridor (south-west of Theberton) falls within a Zone 3 (Total Catchment) SPZ associated with public water supply abstractions within the region (outside the Draft Order Limits).

12.6.65 Licenced abstractions and private water supplies are illustrated in **Figure 12.1** and **Figure 12.2**. There are a number of abstractions within 500m of the proposed Underground HVDC Cable Corridor, although none are mapped within the Proposed Onshore Scheme Draft Order Limits. Further detail on the abstractions and private water supplies is provided in **Appendix 12.3 Hydrogeological Impact Assessment.**

Flood Risk

12.6.66 **Appendix 12.1 Preliminary FRA** identifies flood risk in the area of the proposed Underground HVDC Cable Corridor as follows:

a. Sea: Negligible.

b. River (Fluvial): Parts of the proposed Underground HVDC Cable Corridor and associated access routes intersect with areas at high risk of flooding. These areas correspond to intersections with unnamed tributaries of Hundred River 1 and 2, unnamed tributaries of Minsmere Old River 1-4, upper reaches of Minsmere Old River and Dunwich River, and an unnamed tributary of Minsmere near Darsham.
c. Surface Water (Pluvial): Some parts of the area are at a high risk of flooding.
d. Groundwater: Limited potential for groundwater flooding at surface.
e. Reservoir: No risk.
f. Other sources: Risks from other sources as identified (such as from utilities) will be confirmed in the ES.

12.6.67 **Figure 12.5** and **Figure 12.6** illustrate the risk of flooding from pluvial and fluvial sources respectively. **Figure 12.7** illustrates the susceptibility to groundwater flooding.

Proposed Landfall Site

Surface Water

12.6.68 **Figure 12.1**, **Figure 12.3** and **Figure 12.8** illustrate the surface water features within the study area.

12.6.69 The proposed Landfall Site is approximately 400m from the coastline, with the Dunwich River (an Environment Agency main River) crossing the Draft Order Limits between the proposed Landfall and coastline before joining the River Blyth. The River Blyth is to the north-east of the proposed Landfall, at greater than 500m distance.

12.6.70 The proposed Landfall is not located within a WER surface water catchment.

Groundwater

12.6.71 **Figure 9.2** and **Figure 9.3** illustrate the superficial and bedrock geology respectively.

12.6.72 **Figure 12.2** and **Figure 12.4** illustrate the groundwater features within the study area.

12.6.73 The majority of the proposed Landfall Site has no superficial deposits mapped, with sand and gravel of the Lowestoft Formation mapped in the north-west corner. Tidal Flat Deposits (clays and silts) are mapped to the south of the proposed Landfall.

12.6.74 The sand and gravel deposits of the Lowestoft Formation are designated as a Secondary A aquifer.

12.6.75 The bedrock geology at the proposed Landfall is of the Crag Group which comprises sands, gravels, silts and clays.

12.6.76 The bedrock geology is designated a Principal aquifer.

12.6.77 The Proposed Landfall is within the Waveney and East Suffolk Chalk and Crag groundwater WER catchment.

Water Dependent Terrestrial Ecosystems

12.6.78 Designated GWDTE are illustrated on **Figure 12.2**. The proposed Landfall is to the north-west of the Minsmere-Walberswick Heath and Marshes SSSI (within the Draft Order Limits as the proposed Underground Cable comes onshore, via HDD).

12.6.79 Non-designated WDTE have not been identified at this stage and will be reviewed at the ES stage based on habitat data.

Water Resources

12.6.80 The region is currently classified as a serious water stressed area by the Environment Agency, with a supply deficit.

12.6.81 The proposed Landfall is not located within a SPZ.

12.6.82 Licenced abstractions and private water supplies are illustrated in **Figure 12.1** and **Figure 12.2**. The closest abstraction is more than 1km distance from the proposed Landfall.

Flood Risk

12.6.83 **Appendix 12.1 Preliminary FRA** identifies flood risk in the area of the Proposed Landfall as follows:

a. Sea: A small area of the construction compound for the proposed Landfall Site will lie within the extent of sea flooding and flooding from the tidal Dunwich River in a 0.5% Annual Exceedance Probability (AEP) event after taking into account future climate change (including sea level rise to 2125.
b. River (Fluvial): Negligible (beyond flooding associated with the sea and tidal Dunwich River).
c. Surface Water (Pluvial): Low risk of pluvial flooding.
d. Groundwater: Limited potential for groundwater flooding at surface.
e. Reservoir: No risk.
f. Other sources: Risks from other sources as identified (such as from utilities) will be confirmed in the ES.

12.6.84 **Figure 12.5** and **Figure 12.6** illustrate the risk of flooding from pluvial and fluvial sources respectively. **Figure 12.7** illustrates the susceptibility to groundwater flooding.

Baseline Summary

12.6.85 **Table 12.10** summarises the water environment receptors within the study area and their assigned importance in accordance with the criteria defined in **Table 12.8.**

Table 12.10: Baseline Receptor Summary

Receptor	Importance
Surface water	
Fromus and tributaries having a WFD classification shown in a RBMP	Very High[6]
Hundred River and tributaries having a WFD classification shown in a RBMP	Very High
Minsmere Old River and tributaries having a WFD classification shown in a RBMP	Very High
Blyth (d/s Halesworth) and tributaries having a WFD classification shown in a RBMP	Very High
Main Rivers not having a WFD classification shown in a RBMP (Friston River and Dunwich River)	High
Ordinary Watercourses not having a WFD classification shown in a RBMP	Low to Medium
Minor agricultural drains	Low
Groundwater	
Waveney and East Suffolk Chalk and Crag water Body – Crag (Principal Aquifer)	Very High
Peat (Secondary undifferentiated)	Medium
Alluvium (Secondary A)	Medium
Tidal Flat Deposits (Unproductive)	Low
Head (Secondary undifferentiated)	Medium
Lowestoft Formation – Diamicton (Secondary undifferentiated)	Medium
Lowestoft Formation – Clays and Silts (Secondary B)	Medium
Lowestoft Formation – Sands and Gravels (Secondary A)	Medium
Groundwater-surface water interactions including springs (Mapped and unmapped)	High
WDTEs	
Minsmere-Walberswick Heath and Meadows GWDTE	Very High
Non-designated WDTE	High
Water Resources	
Licensed Abstractions (see **Appendix 12.3**)	High
Private Water Supplies (see **Appendix 12.3**)	Medium
Consented Discharges (see **Appendix 12.3**)	Low
Flood Risk	

[6] It is noted that the Chapter considers the catchment as a whole, and as such has applied a higher importance than **Appendix 12.2** which has looked at the value of the individual watercourses.

Receptor	Importance
Proposed Onshore Scheme	Low (Water Compatible) to Very High (Essential Infrastructure)
Area within study area not within Draft Order Limits	Low (Water Compatible) to Very High (Essential Infrastructure)

Future baseline

12.6.86 In undertaking the assessment, the following aspects have been considered:

a. Climate change predictions
b. Committed developments

12.6.87 The future baseline is considered to be from 2028.

Climate Change

12.6.88 Climate change is expected to result in wetter winters, drier summers, higher average temperatures and higher intensity rainfall events. Climate change has the potential to directly affect surface water and groundwater levels, soil erosion, and indirectly (through groundwater level changes) – the potential for mobilisation of contamination (see **Chapter 9 Geology and Contamination**). In the context of soil erosion, surface water and groundwater levels, it is considered that these are not likely to impact on the significance of effects given the nature of the Proposed Onshore Scheme, where ground disturbance will be limited to the construction phase.

12.6.89 Climate change impacts on flood risk have been considered in **Appendix 12.1 Preliminary FRA** in line with relevant planning policy, and on water resources in **Appendix 12.4 Water Cycle Study** of this PEIR**.**

12.6.90 See **Chapter 27 Climate Change and Carbon** for further information on in combination climate change assessment.

Committed Developments - Proposed Underground HVDC Cable Corridor

12.6.91 The Sizewell Link Road is a committed development associated with the delivery of Sizewell C which has been identified and included in the future baseline as a new receptor to the Proposed Onshore Scheme within the proposed Underground HVDC Cable Corridor (further detail provided in **Chapter 5 EIA Approach and Methodology** of this PEIR). The presence of Sizewell Link Road is unlikely to cause changes to the water environment either prior to, or during the construction, operation and maintenance, or decommissioning phases of the Proposed Onshore Scheme. As such, the Sizewell Link Road is not considered to result in new or different effects.

12.6.92 The proposed Landfall Site is located in an area of the Suffolk coastline which is susceptible to erosion from wave action and climate change. Future coastal erosion has been considered and addressed in **Chapter 18 Marine Physical Environment** of this PEIR.

12.6.93 The future baseline for the worst-case assessment assumes that no other schemes have come forward in the same locale. Therefore, no changes are anticipated to the Hydrology, Hydrogeology and Drainage baseline prior to the construction phase of the Proposed Onshore Scheme.

12.7 Embedded design mitigation and control measures

Design and embedded mitigation measures

12.7.1 As described in **Chapter 2 Description of the Proposed Scheme** of this PEIR, a range of measures have been embedded into the Proposed Onshore Scheme design to avoid or reduce environmental effects. These primary mitigation measures form part of the design that has been assessed, which for Hydrology, Hydrogeology and Drainage key measures are listed in **Table 12.11**.

Control measures

12.7.2 Preliminary control measures are set out in **Appendix 2.1 Outline Onshore CoCP** which will manage the effects of construction. The measures of particular relevance to Hydrology, Hydrogeology and Drainage are listed in **Table 12.11**.

Table 12.11: Design and embedded mitigation and control measures relevant to Hydrology, Hydrogeology and Drainage.

Commitment reference code	Design and embedded mitigation and control measure	Compliance mechanism
Key Design and Embedded Mitigation Measures		
N/A	Routing of the proposed Underground HVDC Cable Corridor to avoid sensitive water environment receptors (such as SPZ1 and SPZ2).	Draft Order Limits
N/A	Site selection to avoid areas of medium and high flood risk areas, where feasible.	Draft Order Limits
WR:1	Where reasonably practicable, avoid watercourse crossings and flood plains. High value watercourses to be crossed by trenchless methods. Any crossings shall be perpendicular to the watercourse, where reasonably practicable. Any construction works shall be located outside Flood Zone 2 and 3.	Embedded mitigation by design
WR:4	Where reasonably practicable, dispose of any drainage and other non-foul discharges to surface and groundwater following the principles of Sustainable Drainage Systems (SUDS), and in accordance with relevant pollution prevention guidelines/Environmental Permitting Regulations.	Embedded mitigation by design
Control Measures		
WR:13	The principal contractor will prepare a pollution incident control plan to manage the risk of pollution incidents.	Outline Onshore CoCP
WR:14	All works within or proximity to main rivers or Ordinary Watercourses will be undertaken in accordance with a method approved by the relevant authority, or the protective provisions of the DCO. Appropriate flood risk activity environmental permits or land drainage consents will be obtained.	Outline Onshore CoCP
WR:15	The principal contractor will require site activities and working methods to be managed to protect the quality of surface water and groundwater resources from other adverse effects, including changes to the hydrological regime through controls to manage the rate and volume of runoff. Where required, the principal contractor will include arrangements to obtain appropriate approval for works.	Outline Onshore CoCP

Commitment reference code	Design and embedded mitigation and control measure	Compliance mechanism
WR:16	The principal contractor will subscribe to the Environment Agency's Floodline service, the Met Office's Weather Warnings email alerts system and any other relevant flood warning information.	Outline Onshore CoCP
WR:17	The principal contractor will implement a suitable flood risk action plan which will include appropriate evacuation procedures should a flood occur or be forecast.	Outline Onshore CoCP
WR:18	Where practicable, riverbank and in-channel vegetation will be retained.	Outline Onshore CoCP
WR:19	Active licenced abstractions and private water supplies will be identified with landowners and appropriate measures will be considered during construction. In the event of a landowner or tenant reporting that installation activities have affected water supplies, an initial response will be provided within 24 hours. Where the installation works have affected a PWS, an alternative water supply will be provided, as appropriate.	Outline Onshore CoCP
WR:20	In the event of a large spill with the potential to cause pollution during construction, all relevant landowners/tenants, within 250m of the spill, will be contacted within 24 hours. When located within SPZ3, the Environment Agency and relevant water supply owner will be contacted immediately. It will be determined if any licenced abstractions or private water supplies might be affected. An assessment of the likelihood of groundwater contamination reaching identified licenced abstractions and private water supplies will be undertaken, and where a PWS is likely to have been affected, an alternative water supply will be provided, as appropriate.	Outline Onshore CoCP
WR:21	For open cut minor watercourse/drain crossings and installation of vehicle crossing points, good practice measures will be implemented, including: a) Reducing the working width for open cut crossings of a watercourse whilst sill providing safe working; b) Installation of a pollution boom downstream of open cut works; c) The use and maintenance of temporary lagoons, tanks, bunds, silt fences or silt screens as required; d) Have spill kits and straw bales readily available at all crossing points for downstream emergency use in the event of a pollution incident. Staff will be trained on their use; e) The use of all static plant such as pumps in appropriately sized spill trays;	Outline Onshore CoCP

Commitment reference code	Design and embedded mitigation and control measure	Compliance mechanism
	f) Stationary plant will be used with secondary containments measures such as plant nappies to retain any leakage of oil or fuel, which will be emptied at regular intervals to prevent overflow; g) Prevent refuelling of any plant or vehicle within 15m of a watercourse; h) Prevent storing of soil stockpiles within 15m of a main river; i) Inspect all plant prior to work adjacent to watercourses for leaks of fuel or hydraulic fluids; and j) Reinstating the riparian vegetation and natural bed of the watercourse, using the material removed when appropriate, on completion of the works and compacting as necessary. If additional material is required, appropriately sized material of similar composition will be used.	
WR:22	Watercourse crossings will utilise appropriate construction techniques which will be selected based on watercourse dimensions, flow conditions and environmental sensitivity. To prevent potential deterioration, all main rivers will be crossed by trenchless techniques to avoid physical changes and impacts on flow and sediment transport regimes and hydromorphology. All trenchless crossings will utilise methodologies which exclude groundwater. Permanent watercourse realignments/diversions and in-channel structures should be avoided where practicable (unless providing betterment).	Outline Onshore CoCP
WR:23	Where a main river is crossed by a trenchless crossing, the proposed Underground Cables are to be laid with sufficient cover to minimise the risks of future erosion exposing the proposed Underground Cables or fluid loss during construction. Marker posts will be positioned on each bank of the river to indicate the location of the under-crossing and the nature of the works.	Outline Onshore CoCP
WR:24	The contractors will, as far as reasonably practicable, ensure that flood risk is managed safely throughout the construction and implementation period and consider flooding when planning sites and storing materials. A risk based precautionary approach using the source – pathway – receptor' concept will be applied to temporary and permanent works. Designers and contractors will be required to prepare construction and permanent works proposals that are safe and ensure that flood risk (including that to third parties and the proposed works) is managed appropriately. Where necessary this will include the provision of evidence	Outline Onshore CoCP

Commitment reference code	Design and embedded mitigation and control measure	Compliance mechanism
	that appropriate flood warning and emergency management measures are established and that detailed designs are supported by provision for long term management and maintenance. Where practicable, contractors should avoid locating temporary structures, such as accommodation and stockpiles, and placing construction equipment within Flood Zone 3 areas or areas at significant risk of flooding from other sources.	
WR:25	Sustainable Drainage System (SuDS) techniques will be utilised at permanent above ground installations to manage rainfall runoff in terms of both quality and quantity, as well as within construction compounds and along the pipeline corridor during construction. Techniques will be selected based on the ground conditions, and with reference to the hierarchy outlined in the PPG for Flood Risk and Coastal Change. Surface water management will achieve sufficient attenuation and treatment of surface water runoff to avoid increases in flood risk and pollution of the water environment.	Outline Onshore CoCP
WR:26	All land drainage will be reinstated on completion of works.	Outline Onshore CoCP
WR:27	Any abstractions required for the works will be temporary in nature (e.g. construction dewatering) with no permanent abstractions proposed or required.	Outline Onshore CoCP
WR:28	Where new or additional surfacing is required within access tracks and compound areas, it will be permeable surfaces where ground conditions allow.	Outline Onshore CoCP
WR:29	Temporary haul routes within Flood Zone 2 or 3 and areas of high and medium risk of flooding from surface water will be removed at the end of construction and the ground surface will be reinstated to pre-construction levels.	Outline Onshore CoCP
WR:30	Appropriate construction methods will be employed to minimise the risk of mixing aquifer bodies.	Outline Onshore CoCP
WR:31	Any temporary dewatering activities during construction will be undertaken in accordance with Environment Agency guidance and, if required, relevant abstraction licence and environmental permits obtained. Activities will be limited to the depth and time required to facilitate construction activities.	Outline Onshore CoCP
WR:32	Where the cable trench is installed below the water table, the trench backfill will include clay stanks at set intervals (informed by the detailed design) to prevent the	Outline Onshore CoCP

Commitment reference code	Design and embedded mitigation and control measure	Compliance mechanism
	trench acting as a preferential pathway and altering local groundwater flow paths/levels.	
WR:33	The contractor will produce the following management plans/risk assessments prior to commencement of works: • Water Management Plan; • A Fluid Breakout/Frac-Out Management Plan; and • Foundation Works Risk Assessment.	Outline Onshore CoCP
WR:34	The principal contractor will manage impacts from construction on groundwater dependant ecosystems, through employing best-practice construction measures, including: • Drainage designed not to increase flood risk on third party land, including ecological sites; • Dewatering activities undertaken in line with appropriate licences and permits; • Groundwater control operations to be non-consumptive with water maintained in water environment, where feasible; • Specific mitigation at designated and non-designated Groundwater Dependent Terrestrial Ecosystems (such as discharge/recharge arrangements) to be informed by hydrogeological impact assessment; and • Developing a water monitoring plan.	Outline Onshore CoCP

12.8 Assessment of effects

12.8.1 This section presents the preliminary assessment of likely significant effects on Hydrology, Hydrogeology and Drainage resulting from the construction, operation and maintenance, and decommissioning of the Proposed Onshore Scheme.

12.8.2 Throughout this assessment, the likely significant effects of the Proposed Onshore Scheme are identified assuming the control measures set out in the **Outline Onshore CoCP (Appendix 2.1)** for construction effects, and embedded design mitigation and **Design Principles published as part of Statutory Consultation** for operational effects.

12.8.3 Following assessment further mitigation is proposed as required which is presented in **Section 12.9.**

Construction

Kiln Lane Substation

Surface Water Quality

12.8.4 Impacts to surface water quality could occur from various construction activities including fluid breakout from piling, mobilisation of sediment into local watercourses from earthworks, discharges to surface water from water management, and the accidental release of pollutants from construction activities.

12.8.5 The main receptors at the proposed Kiln Lane Substation are minor agricultural ditches (low importance) and the Friston River (high importance) downstream of the Kiln Lane Substation, which could be susceptible to a pollution incident from sediment disturbance, construction discharges or a spillage. With embedded design mitigation and control measures in place, the magnitude of temporary construction impacts on surface water quality is considered to be negligible. The effects to the Friston River (**minor** effect) and minor agricultural ditches (**negligible** effect) would therefore be **not significant.**

Surface Water Quantity and Geomorphology

12.8.6 Impacts to surface water quantity or geomorphology could occur due to alteration of the land drainage regime or changes to baseflow during construction. No direct physical interaction with watercourses of medium or higher importance are proposed.

12.8.7 The main receptors at the proposed Kiln Lane Substation are minor agricultural ditches (low importance) and the Friston River (high importance) downstream which could be impacted by activities such as construction drainage.

12.8.8 With embedded mitigation and control measures including implementation of SuDS (**Paragraph 12.8.2**), the magnitude of temporary construction impacts on surface water quantity and geomorphology is considered to be negligible. The

effects to the Friston River (minor effect) and minor agricultural ditches (**negligible** effect) would therefore be **not significant.**

Groundwater Quality

12.8.9 Impacts to groundwater quality could occur from various construction activities including fluid breakout from piling, discharges to groundwater from water management, and accidental release of pollutants from construction activities. Impacts as a result of mobilising existing contamination are presented in **Chapter 15 Geology and Contamination.**

12.8.10 The main identified receptors at the proposed Kiln Lane Substation are the hydraulically connected aquifers (medium to very high importance) and local abstractions and private water supplies (medium to high importance) which could be impacted by any discharges to ground migrating into the underlying aquifer and connected receptors.

12.8.11 On the basis that works are managed in compliance with consenting requirements, and embedded measures and controls (para. 12.8.2) including a foundation works risk assessment and SuDS**,** the magnitude of temporary construction impacts on groundwater quality is considered to be negligible. The effects to the aquifers and local water resources would therefore be **minor to negligible**, **not significant.**

Groundwater Quantity

12.8.12 Impacts to groundwater flows and levels could occur from various construction activities including groundwater control measures, discharges to ground, installation of below ground infrastructure and altered recharge (from soil stripping or new impermeable surfaces)**.**

12.8.13 The main receptors at the proposed Kiln Lane Substation are the hydraulically connected aquifers (medium to very high importance) and local abstractions and private water supplies (medium to high importance). These receptors could be impacted by any groundwater control activities, underground structures or drainage altering groundwater levels and flows, and subsequently baseflow to dependent receptors.

12.8.14 Ground investigation indicates the groundwater table is likely to be below proposed earthwork excavation formations (requiring limited groundwater control) in the area of the proposed Kiln Lane Substation. On the basis that water is managed in compliance with consenting requirements, and embedded measures and controls (para. 12.8.2) including a foundation works risk assessment and implementation of SuDS**,** the magnitude of temporary construction impacts on groundwater flows and levels is considered to be negligible. The effects to the aquifers and local water resources would therefore be **minor to negligible**, **not significant.**

Water Dependent Terrestrial Ecosystems

12.8.15 At this stage, no WDTEs have been identified in the area of the proposed Kiln Lane Substation. The presence of non-designated WDTE will be assessed for the ES based on habitat mapping and survey data.

12.8.16 The magnitude of temporary construction impacts (such as groundwater lowering during excavation) on providing baseflow to WDTE is considered to be negligible. Other impacts on the terrestrial ecosystems are assessed within **Chapter 8 Ecology and Biodiversity.** The effects to non-designated WDTE of high importance would therefore be **minor**, **not significant.**

Flood Risk

12.8.17 **Appendix 12.1 Preliminary FRA** outlines the flood risk impacts to, and as a result of, the Proposed Onshore Scheme.

12.8.18 At the proposed Kiln Lane Substation and its associated infrastructure, flood risk during construction is limited primarily to pluvial flooding, with negligible risk of flooding from rivers, groundwater or other sources.

12.8.19 Flood risk to, and as a result of, the Proposed Onshore Scheme during construction would be addressed through embedded design measures including avoidance of placement of construction compounds and activities in flood plains and control measures including implementation of SuDS (**Paragraph 12.8.2**). This includes limiting runoff to greenfield rates to prevent effects outside of the Draft Order Limits; including impacts on Friston village which is susceptible to flooding.

12.8.20 With flood impacts designed out, the magnitude of impact of flooding to the Proposed Onshore Scheme and as a result of the Proposed Onshore Scheme is negligible.

12.8.21 The effects of flooding to the Proposed Onshore Scheme and effects outside of the Draft Order Limits as a result of the Proposed Onshore Scheme would therefore be **minor**, **not significant.**

High Voltage Alternating Current Underground Cable Corridor

Surface Water Quality

12.8.22 Impacts to surface water quality could occur from various construction activities associated with the proposed Underground HVAC Cable Corridor including fluid breakout from trenchless crossings, mobilisation of sediment into local watercourses from earthworks, discharges to surface water from water management, and the accidental release of pollutants from a construction activities.

12.8.23 The main receptors along the proposed Underground HVAC Cable Corridor are unnamed tributary of the Fromus 1 (low importance) and minor agricultural ditches (low importance) which could be susceptible to a pollution incident from sediment disturbance or a spillage (particularly during open-cut crossing).

12.8.24 With embedded design mitigation and control measures including implementation of SuDS (**Paragraph 12.8.2**), the magnitude of temporary construction impacts on surface water quality is considered to be negligible. The effects to the tributary of the Fromus and minor agricultural ditches would therefore be **negligible**, **not significant.**

Surface Water Quantity and Geomorphology

12.8.25 Impacts to surface water quantity or geomorphology could occur due to alteration of the land drainage regime or changes to baseflow during construction. The Southern route option includes a temporary opencut crossing of the unnamed tributary of the Fromus 1.

12.8.26 The main receptors along the proposed Underground HVAC Cable Corridor are unnamed tributary of the Fromus 1 (low importance) and minor agricultural ditches (low importance) which will be directly physically impacted during open cut excavation and could also be impacted by construction activities such as construction drainage.

12.8.27 With embedded design mitigation and control measures including implementation of SuDS (**Paragraph 12.8.2**) and reinstatement**,** the magnitude of temporary construction impacts on surface water quantity and geomorphology is considered to be negligible.

12.8.28 The effects to the tributary of the Fromus and minor agricultural ditches would therefore be **negligible**, **not significant.**

Groundwater Quality

12.8.29 Impacts to groundwater quality could occur from various construction activities including fluid breakout from trenchless crossings, discharges to groundwater from water management and accidental release of pollutants from construction activities. Impacts as a result of mobilising existing contamination are presented in **Chapter 15 Geology and Contamination** (which identified no significant effects)**.**

12.8.30 The main receptors along the proposed Underground HVAC Cable Corridor are the hydraulically connected aquifers (medium to very high importance) and local abstractions and private water supplies (medium to high importance) which could be impacted by any discharges to ground migrating into the underlying aquifer and connected receptors.

12.8.31 With embedded design mitigation and control measures (**Paragraph 12.8.2**) including implementation of SuDS and a fluid breakout management plan**,** the magnitude of temporary construction impacts on groundwater quality is considered to be negligible.

12.8.32 The effects to the aquifers and local water resources would therefore be **minor to negligible**, **not significant.**

Groundwater Quantity

12.8.33 Impacts to groundwater flows and levels could occur from various construction activities including groundwater control measures, discharges to ground, installation of below ground infrastructure and altered recharge (from soil stripping or new impermeable surfaces)**.**

12.8.34 The main receptors along the proposed Underground HVAC Cable Corridor are the hydraulically connected aquifers (medium to very high importance) and local abstractions and private water supplies (medium to high importance). These receptors could be impacted by any groundwater control activities, underground structures or drainage altering groundwater levels and flows, and subsequently baseflow to dependent receptors.

12.8.35 With embedded design mitigation and control measures (**Paragraph 12.8.2**), the magnitude of temporary construction impacts on groundwater flows and levels is considered to be negligible.

12.8.36 The effects to the aquifers and local water resources would therefore be **minor to negligible**, **not significant.**

Water Dependent Terrestrial Ecosystems

12.8.37 At this stage, no WDTEs have been identified in the area of the proposed Underground HVAC Cable Corridor. The presence of non-designated WDTE will be assessed for the ES based on habitat mapping and survey data.

12.8.38 Regardless, with embedded design mitigation and control measures (**Paragraph 12.8.2**), the magnitude of temporary construction impacts on providing baseflow to WDTE is considered to be **negligible** and not **significant**. Other impacts on terrestrial ecosystems are assessed within **Chapter 8 Ecology and Biodiversity** (which concludes no significant effects on WDTEs)**.**

12.8.39 The effects to non-designated WDTE of high importance would therefore be **minor**, **not significant.**

Flood Risk

12.8.40 **Appendix 12.1 Preliminary FRA** outlines the flood risk impacts to, and as a result of, the Proposed Onshore Scheme.

12.8.41 During construction, the proposed Underground HVAC Cable Corridor includes areas of fluvial (associated with the unnamed tributary of the Fromus 1) and pluvial flood risk.

12.8.42 Flood risk to, and as a result of, the Proposed Onshore Scheme during construction would be addressed through embedded design measures and Outline Onshore CoCP including avoidance of placement of construction compounds and activities in flood zones, together with control measures including implementation of SuDS (**Paragraph 12.8.2**). This includes limiting runoff to greenfield rates to prevent effects outside of the Draft Order Limits.

12.8.43 With embedded design mitigation and control measures (**Paragraph 12.8.2**), magnitude of impact of flooding to the Proposed Onshore Scheme and as a result of the Proposed Onshore Scheme is negligible.

12.8.44 The effects of flooding to the Proposed Onshore Scheme and effects outside of the Draft Order Limits as a result of the Proposed Onshore Scheme would therefore be **minor**, **not significant.**

Proposed Converter Station

Surface Water Quality

12.8.45 Impacts to surface water quality could occur from various construction activities including fluid breakout from piling, mobilisation of sediment into local watercourses from earthworks, discharges to surface water from water management or the accidental release of pollutants from construction activities.

12.8.46 The main receptors at the proposed Converter Station are the Fromus (very high importance) which will be crossed by a permanent access track and minor agricultural ditches (low importance) which could be susceptible to a pollution incident from sediment disturbance or a spillage.

12.8.47 With embedded design mitigation and control measures (**Paragraph 12.8.2**), the magnitude of temporary construction impacts on surface water quality is considered to be negligible.

12.8.48 The effects to the Fromus (**minor** effects) and minor agricultural ditches (**negligible** effects) would therefore be **not significant.**

Surface Water Quantity and Geomorphology

12.8.49 Impacts to surface water quantity or geomorphology could occur during the construction of a permanent crossing, alteration of the land drainage regime or changes to baseflow.

12.8.50 The main receptors at the proposed Converter Station are the Fromus (very high importance) and minor agricultural ditches (low importance) downstream which could be impacted by construction activities such as bridge construction or construction drainage.

12.8.51 The Fromus crossing will comprise a clear span structure to minimise any impacts on hydromorphological process and aquatic habitats, setback abutments. On the basis of the embedded design, together with control measures (**Paragraph 12.8.2**), the magnitude of temporary construction impacts on surface water quantity and geomorphology is considered to be negligible.

12.8.52 The effects to the Fromus (**minor** effects) and minor agricultural ditches (**negligible** effects) would therefore be **not significant.**

Groundwater Quality

12.8.53 Impacts to groundwater quality could occur from various construction activities including fluid breakout from piling, discharges to groundwater from water management and accidental release of pollutants from construction activities. Impacts as a result of mobilising existing contamination are presented in **Chapter 15 Geology and Contamination.**

12.8.54 The main receptors at the proposed Converter Station are the hydraulically connected aquifers (medium to very high importance) and local abstractions and private water supplies (medium to high importance) which could be impacted by any discharges to ground migrating into the underlying aquifer and connected receptors.

12.8.55 With embedded design mitigation and control measures (**Paragraph 12.8.2**) including SuDS and a foundation works risk assessment**,** the magnitude of temporary construction impacts on groundwater quality is considered to be negligible.

12.8.56 The effects to the aquifers and local water resources would therefore be **minor to negligible**, **not significant.**

Groundwater Quantity

12.8.57 Impacts to groundwater flows and levels could occur from various construction activities including groundwater control measures, discharges to ground, installation of below ground infrastructure and altered recharge (from soil stripping or new impermeable surfaces)**.**

12.8.58 The main receptors at the proposed Converter Station are the hydraulically connected aquifers (medium to very high importance) and local abstractions and private water supplies (medium to high importance). These receptors could be impacted by any groundwater control activities, underground structures or drainage altering groundwater levels and flows, and subsequently baseflow to dependent receptors.

12.8.59 On the basis that water is managed in compliance with consenting requirements, with embedded design mitigation and control measures (**Paragraph 12.8.2**) including a foundation works risk assessment and implementation of SuDS**,** the magnitude of temporary construction impacts on groundwater flows and levels is considered to be negligible.

12.8.60 The effects to the aquifers and local water resources would therefore be **minor to negligible**, **not significant.**

Water Dependent Terrestrial Ecosystems

12.8.61 At this stage, no WDTE have been identified in the area of the proposed Converter Station. The presence of non-designated WDTE will be assessed for the ES based on habitat mapping and survey data.

12.8.62 Regardless, with embedded design mitigation and control measures (**Paragraph 12.8.2**), the magnitude of temporary construction impacts on providing baseflow to WDTE is considered to be negligible. Other impacts on the terrestrial ecosystems are assessed within **Chapter 8 Ecology and Biodiversity.**

12.8.63 The effects to non-designated WDTE of high importance would therefore be **minor**, **not significant.**

Flood Risk

12.8.64 **Appendix 12.1 Preliminary FRA** outlines the flood risk impacts to, and as a result of, the Proposed Onshore Scheme.

12.8.65 During construction, the proposed Converter Station includes interaction with areas of fluvial (crossing of the River Fromus) and pluvial flood risk.

12.8.66 Flood risk to, and as a result of, the Proposed Onshore Scheme during construction would be addressed through embedded design measures, including avoidance of placement of construction compounds and activities in flood plains and control measures such as implementation of SuDS. This also includes a bridge which has been designed for flood flows/levels and limiting runoff to greenfield rates to prevent effects beyond the Draft Order Limits.

12.8.67 On the basis of the embedded mitigation, together with control measures (**Paragraph 12.8.2**), the magnitude of impact of flooding to the Proposed Onshore Scheme and as a result of the Proposed Onshore Scheme is negligible.

12.8.68 The effects of flooding to the Proposed Onshore Scheme and effects beyond the Draft Order Limits as a result of the Proposed Onshore Scheme would therefore be **minor**, **not significant.**

High Voltage Direct Current Underground Cable Route

Surface Water Quality

12.8.69 Impacts to surface water quality could occur from various construction activities including fluid breakout from trenchless crossings, mobilisation of sediment into local watercourses from earthworks, discharges to surface water from water management or the accidental release of pollutants from a range of activities.

12.8.70 The main receptors along the proposed Underground HVDC Cable Corridor are unnamed tributaries of the Hundred River 1 and 2, Minsmere Old River, unnamed tributaries of Minsmere Old River 1 to 4 and Dunwich River (ranging from very high to low importance) as well minor agricultural ditches (low importance) which are crossed along the proposed Underground HVDC Cable Corridor. The higher value watercourses crossed by trenchless methods could be susceptible to fluid breakout during construction, whilst minor ditches could be susceptible to a pollution incident from sediment disturbance or a spillage.

12.8.71 All watercourses of medium and higher importance will be crossed by trenchless methods to avoid direct impacts to the watercourses. With control measures

(**Paragraph 12.8.2**) including a breakout management plan and SuDS**,** the magnitude of temporary construction impacts on surface water quality is considered to be negligible.

12.8.72 The effects to the watercourses would therefore be **minor to negligible**, **not significant.**

Surface Water Quantity and Geomorphology

12.8.73 Impacts to surface water quantity or geomorphology could occur during construction due to watercourse crossings, alteration of the land drainage regime or changes to baseflow during construction. No direct physical interaction with watercourses of medium or higher importance are proposed, with open cut crossings limited to low value water bodies.

12.8.74 The main receptors along the proposed Underground HVDC Cable Corridor are unnamed tributaries of the Hundred River 1 and 2, Minsmere Old River, unnamed tributaries of Minsmere Old River 1 to 4 and Dunwich River (ranging from very high to low importance) as well minor agricultural ditches (low importance) which are crossed along the proposed Underground HVDC Cable Corridor.

12.8.75 Lower value watercourses/ditches could be directly physically impacted during open cut excavation and could also be impacted by construction activities such as construction drainage. All watercourses of medium and higher importance will be crossed by trenchless methods to avoid direct impacts to the watercourses but could be impacted by activities such as construction drainage. With control measures (**Paragraph 12.8.2**), the magnitude of construction impacts on surface water quantity and geomorphology is considered to be negligible.

12.8.76 The effects to the watercourses and minor agricultural ditches would therefore be **minor to negligible**, **not significant.**

Groundwater Quality

12.8.77 Impacts to groundwater quality could occur from various construction activities including fluid breakout from trenchless crossing, discharges to groundwater from water management and accidental release of pollutants from construction activities. Impacts as a result of mobilising existing contamination are presented in **Chapter 15 Geology and Contamination.**

12.8.78 The main receptors along the proposed Underground HVDC Cable Corridor are the hydraulically connected aquifers (medium to very high importance) and local abstractions and private water supplies (medium to high importance) which could be impacted by any discharges to ground migrating into the underlying aquifer and connected receptors.

12.8.79 With control measures (para. 12.8.2) including a breakout management plan and implementation of SuDS**,** the magnitude of temporary construction impacts on groundwater quality is considered to be negligible.

12.8.80 The effects to the aquifers and local water resources would therefore be **minor to negligible**, **not significant.**

Groundwater Quantity

12.8.81 Impacts to groundwater flows and levels could occur from various construction activities including groundwater control measures, discharges to ground, installation of below ground infrastructure (preferential pathways or barriers) and altered recharge (from soil stripping or new impermeable surfaces)**.**

12.8.82 The main receptors along the proposed Underground HVDC Cable Corridor are the hydraulically connected aquifers (medium to very high importance) and local abstractions and private water supplies (medium to high importance). These receptors could be impacted by any groundwater control activities, underground structures or drainage altering groundwater levels and flows, and subsequently baseflow to dependent receptors.

12.8.83 On the basis that water is managed in compliance with consenting requirements, together with control measures (para. 12.8.2) including a breakout management plan and implementation of SuDS**,** the magnitude of temporary construction impacts on groundwater flows and levels is considered to be negligible.

12.8.84 The effects to the aquifers and local water resources would therefore be **minor to negligible**, **not significant.**

Water Dependent Terrestrial Ecosystems

12.8.85 The Minsmere-Walberswick Heath and Marshes SSSI (a very high importance GWDTE) is crossed by the proposed Underground HVDC Cable Corridor, via a trenchless methodology, to the west of Walberswick.

12.8.86 At this stage, no non-designated WDTEs have been identified in the study area of the proposed Underground HVDC Cable Corridor. The presence of non-designated WDTE will be assessed for the ES based on habitat mapping and survey data.

12.8.87 The Minsmere-Walberswick GWDTE will be crossed by trenchless methods, which excludes groundwater limiting potential drawdown and reduction in baseflow beneath the GWDTE. With control measures (**Paragraph 12.8.2**) including a breakout management plan, the magnitude of temporary construction impacts on baseflow to both the designated GWDTE and non-designated WDTE is considered to be negligible. Other impacts on the terrestrial ecosystems are assessed within **Chapter 8 Ecology and Biodiversity.**

12.8.88 The effects to the Minsmere-Walberswick Heath and Marshes GWDTE of very high importance and non-designated WDTE of high importance would therefore be **minor**, **not significant.**

Flood Risk

12.8.89 **Appendix 12.1 Preliminary FRA** outlines the flood risk impacts to, and as a result of, the Proposed Onshore Scheme.

12.8.90 During construction, the proposed Underground HVDC Cable Corridor includes areas of high fluvial and pluvial flood risk, with negligible risk of flooding from groundwater or other sources.

12.8.91 Flood risk to, and as a result of, the Proposed Onshore Scheme during construction would be addressed through embedded design measures and Outline Onshore CoCP including avoidance of placement of construction compounds and activities in flood zones, together with control measures including implementation of SuDS (**Paragraph 12.8.2**). This includes limiting runoff to greenfield rates to prevent effects beyond the Draft Order Limits.

12.8.92 With flood impacts avoided and designed out, the magnitude of impact of flooding to the Proposed Onshore Scheme and as a result of the Proposed Onshore Scheme is negligible.

12.8.93 The effects of flooding to the Proposed Onshore Scheme and effects outside of the Draft Order Limits as a result of the Proposed Onshore Scheme would therefore be **minor**, **not significant.**

Proposed Landfall Site

Surface Water Quality

12.8.94 Impacts to surface water quality could occur from various construction activities including mobilisation of sediment into local watercourses from earthworks, discharges to surface water from water management or the accidental release of pollutants from construction activities.

12.8.95 The main receptors at the proposed Landfall are minor agricultural ditches (low importance) and Dunwich River (high importance) which is downgradient of the proposed Landfall and to be crossed by HDD (at a depth to be determined by investigations during detailed design). The Dunwich River and minor ditches could be susceptible to a pollution incident from sediment disturbance, fluid breakout or a spillage.

12.8.96 With control measures (**Paragraph 12.8.2**) including SuDS, the magnitude of temporary construction impacts on surface water quality is considered to be negligible.

12.8.97 The effects to the Dunwich River (**minor** effects) and minor agricultural ditches (**negligible** effects) would therefore be **not significant.**

Surface Water Quantity and Geomorphology

12.8.98 Impacts to surface water quantity or geomorphology could occur due to alteration of the land drainage regime or changes to baseflow during

construction. No direct physical interaction with watercourses is proposed at the proposed Landfall Site.

12.8.99 The main receptors at the proposed Landfall are minor agricultural ditches (low importance) and Dunwich River (high importance) which is downgradient of the proposed Landfall and will be crossed by trenchless techniques (at depth to be determined by investigations during detailed design). The watercourses could be impacted by activities such as construction drainage.

12.8.100 With embedded design mitigation and control measures (**Paragraph 12.8.2**) including implementation of SuDS**,** the magnitude of temporary construction impacts on surface water quantity and geomorphology is considered to be negligible.

12.8.101 The effects to the Dunwich River (**minor** effects) and minor agricultural ditches (**negligible** effects) would therefore be **not significant.**

Groundwater Quality

12.8.102 Impacts to groundwater quality could occur from various construction activities including fluid breakout from HDD, discharges to groundwater from water management and accidental release of pollutants from construction activities. Impacts as a result of mobilising existing contamination are presented in **Chapter 15 Geology and Contamination.**

12.8.103 The main receptors at the proposed Landfall are the hydraulically connected aquifers (medium to very high importance) which could be impacted by any discharges to ground migrating into the underlying aquifer and connected receptors.

12.8.104 With embedded design mitigation and control measures (**Paragraph 12.8.2**) including a breakout management plan and implementation of SuDS**,** the magnitude of temporary construction impacts on groundwater quality is considered to be negligible.

12.8.105 The effects to the aquifers and local water resources would therefore be **minor to negligible**, **not significant.**

Groundwater Quantity

12.8.106 Impacts to groundwater flows and levels could occur from various construction activities including groundwater control measures, discharges to ground, installation of below ground infrastructure and altered recharge (from soil stripping or new impermeable surfaces)**.**

12.8.107 The main receptors at the proposed Landfall are the hydraulically connected aquifers (medium to very high importance). These receptors could be impacted by any groundwater control activities, underground structures or drainage altering groundwater levels and flows, and subsequently baseflow to dependent receptors.

12.8.108 Ground investigation indicates the groundwater table is at depth in the area of the proposed Landfall, and unlikely to be encountered by shallow earthworks. On the basis that water is managed in compliance with consenting requirements, and with embedded design mitigation and control measures (**Paragraph 12.8.2**) including a breakout management plan and implementation of SuDS**,** the magnitude of temporary construction impacts on groundwater flows and levels is considered to be negligible.

12.8.109 The effects to the aquifers would therefore be **minor to negligible**, **not significant.**

Water Dependent Terrestrial Ecosystems

12.8.110 The Minsmere-Walberswick Heath and Marshes SSSI (a very high importance GWDTE) is within the study area of the proposed Underground HVDC Cable Corridor, and crossed to the south-east of the proposed Landfall as the cable comes onshore.

12.8.111 At this stage, no non-designated WDTEs have been identified in the study area of the proposed Landfall. The presence of non-designated WDTE will be assessed for the ES based on habitat mapping and survey data.

12.8.112 The Minsmere-Walberswick GWDTE will be crossed by a HDD methodology, which excludes groundwater limiting potential drawdown and reduction in baseflow beneath the GWDTE. With embedded design mitigation and control measures (**Paragraph 12.8.2**) including a breakout management plan, the magnitude of temporary construction impacts on baseflow to both the designated GWDTE and non-designated WDTE is considered to be negligible. Other impacts on the terrestrial ecosystems are assessed within **Chapter 8 Ecology and Biodiversity.**

12.8.113 The effects to the Minsmere-Walberswick Heath and Marshes GWDTE of very high importance and non-designated WDTE of high importance would therefore be **minor**, **not significant.**

Flood Risk

12.8.114 **Appendix 12.1 Preliminary FRA** outlines the flood risk impacts to, and as a result of, the Proposed Onshore Scheme.

12.8.115 During construction, at the proposed Landfall and its associated infrastructure, flood risk is low and limited to future tidal/sea flooding risk (not present day), with negligible risk of flooding from rivers, surface water, groundwater or other sources.

12.8.116 Flood risk to, and as a result of, the Proposed Onshore Scheme during construction would be addressed through embedded design measures and Outline Onshore CoCP including avoidance of placement of construction compounds and activities in flood zones, together with control measures

including implementation of SuDS (**Paragraph 12.8.2**). This includes limiting runoff to greenfield rates to prevent effects outside of the Draft Order Limits.

12.8.117 With flood impacts designed out, the magnitude of impact of flooding to the Proposed Onshore Scheme and as a result of the Proposed Onshore Scheme is negligible.

12.8.118 The effects of flooding to the Proposed Onshore Scheme and effects beyond the Draft Order Limits as a result of the Proposed Onshore Scheme would therefore be **minor**, **not significant.**

Operation and maintenance

12.8.119 The Outline CoCP **Appendix 2.1** requires an Outline OEMP to be developed defining operational practices which require adherence by the future operator.

Kiln Lane Substation (both Kiln Lane Substation Scenarios)

Surface Water Quality

12.8.120 Operational impacts to surface water quality could occur from operational drainage or maintenance activities (which would have similar impacts to construction but assumed at a smaller scale).

12.8.121 The main receptors at the proposed Kiln Lane Substation are minor agricultural ditches (low importance) in the area of the proposed Kiln Lane Substation and the Friston River (high importance) downstream which could be adversely impacted by the operational drainage discharges or an accidental spillage during maintenance.

12.8.122 The drainage design for the proposed Kiln Lane Substation would follow SuDS principles to attenuate and appropriately treat runoff prior to discharge. The magnitude of temporary operational maintenance activities on surface water quality is considered to be negligible. The effects to the Friston River (**minor** effects) and minor agricultural ditches (**negligible** effects) would therefore be **not significant.**

Surface Water Quantity and Geomorphology

12.8.123 Impacts to surface water quantity or geomorphology could occur from operational drainage or maintenance activities (which would have similar impacts to construction but assumed at a smaller scale).

12.8.124 The main receptors at the proposed Kiln Lane Substation are minor agricultural ditches (low importance) in the area of the proposed Kiln Lane Substation and the Friston River (high importance) downstream which could be impacted by the operational drainage discharges altering flows.

12.8.125 The drainage design for the proposed Kiln Lane Substation would follow SuDS principles to attenuate and appropriately treat runoff prior to discharge. The magnitude of temporary operational maintenance activities on surface water

quality is considered to be **negligible**. Based on the above, the effects to the Friston River (**minor** effects) and minor agricultural ditches (**negligible** effects) would therefore be **not significant.**

Groundwater Quality

12.8.126 Impacts to groundwater quality could occur from operational drainage or maintenance activities (which would have similar impacts to construction but assumed at a smaller scale). Impacts as a result of mobilising existing contamination are covered in **Chapter 15 Geology and Contamination.**

12.8.127 The main receptors at the proposed Kiln Lane Substation are the hydraulically connected aquifers (medium to very high importance) and local abstractions and private water supplies (medium to high importance) which could be adversely impacted by operational drainage discharges or an accidental spillage during maintenance.

12.8.128 The drainage design for the proposed Kiln Lane Substation would follow SuDS principles to attenuate and appropriately treat runoff prior to discharge. The magnitude of temporary operational maintenance activities on surface water quality is considered to be negligible with effects to the aquifers and local water resources **minor**, **not significant.**

Groundwater Quantity

12.8.129 Impacts to groundwater flows and levels could occur from operational drainage or maintenance activities (which would have similar impacts to construction but assumed at a smaller scale). Impacts as a result of mobilising existing contamination are covered in **Chapter 15 Geology and Contamination.**

12.8.130 The main receptors at the proposed Kiln Lane Substation are the hydraulically connected aquifers (medium to very high importance) and local abstractions and private water supplies (medium to high importance) which could be impacted by operational drainage or maintenance activities altering groundwater levels and flows, and subsequently baseflow to dependent receptors.

12.8.131 The drainage design for the proposed Kiln Lane Substation would follow SuDS principles to attenuate prior to discharge, taking into consideration mounding and groundwater flood risk. The magnitude of temporary operational maintenance activities on groundwater quantity is considered to be negligible with effects to the aquifers and local water resources **minor**, **not significant.**

Water Dependent Terrestrial Ecosystems

12.8.132 At this stage, no WDTEs have been identified in the area of the proposed Kiln Lane Substation. The presence of non-designated WDTE will be assessed for the ES based on habitat mapping and survey data.

12.8.133 The magnitude of temporary operational maintenance activities on WDTE is considered to be negligible. The effects to non-designated WDTE of high importance would therefore be **minor**, **not significant.**

Flood Risk

12.8.134 **Appendix 12.1 Preliminary FRA** outlines the flood risk impacts to, and as a result of, the Proposed Onshore Scheme.

12.8.135 At proposed Kiln Lane Substation and its associated infrastructure, flood risk is limited primarily to pluvial flooding, with negligible risk of flooding from rivers, groundwater or other sources.

12.8.136 Operational flood risk to the Proposed Onshore Scheme and as a result of the Proposed Onshore Scheme will be addressed through the drainage design. This includes limiting runoff to greenfield rates to prevent effects outside of the Draft Order Limits; including impacts on Friston village which is susceptible to flooding.

12.8.137 With flood impacts designed out, the magnitude of impact of flooding to the Proposed Onshore Scheme and as a result of the Proposed Onshore Scheme is negligible.

12.8.138 The effects of flooding to the Proposed Onshore Scheme and effects outside of the Draft Order Limits as a result of the Proposed Onshore Scheme would therefore be **minor**, **not significant.**

Proposed Underground HVAC Cable Corridors

Surface Water and Groundwater

12.8.139 Operational impacts to surface water and groundwater (both quality and quantity) could occur from maintenance activities, which would have similar impacts to construction but assumed at a smaller scale.

12.8.140 The main receptors would be as during construction (see 12.8.23 and 12.8.30). The magnitude of temporary operational maintenance activities on surface water and groundwater is considered to be negligible. The effects to the receptors would therefore be **minor**, **not significant.**

Water Dependent Terrestrial Ecosystems

12.8.141 At this stage, no WDTEs have been identified in the area of the HVAC routes. The presence of non-designated WDTE will be assessed for the ES based on habitat mapping and survey data.

12.8.142 The magnitude of temporary operational maintenance activities on WDTE is considered to be negligible. The effects to non-designated WDTE of high importance would therefore be **minor**, **not significant.**

Flood Risk

12.8.143 **Appendix 12.1 Preliminary FRA** outlines the flood risk impacts to, and as a result of, the Proposed Onshore Scheme.

12.8.144 Following construction, the embedded design measures will result in no adverse change in flood risk from the baseline condition.

12.8.145 With operational flood impacts designed out, the magnitude of impact of flooding to the Proposed Onshore Scheme and as a result of the Proposed Onshore Scheme is negligible.

12.8.146 The effects of flooding to the Proposed Onshore Scheme and effects outside of the Draft Order Limits as a result of the Proposed Onshore Scheme would therefore be **minor**, **not significant.**

Converter Station

Surface Water Quality

12.8.147 Operational impacts to surface water quality could occur from operational drainage or maintenance activities (which would have similar impacts to construction but assumed at a smaller scale).

12.8.148 The main receptors at the proposed Converter Station are the Fromus (Very high importance) which will be crossed by a permanent access track and minor agricultural ditches (low importance). The receptors could be impacted by operational drainage discharges or an accidental spillage during maintenance adversely impacting the watercourse quality.

12.8.149 The drainage design for the permanent access track and Converter Station would follow SuDS principles to attenuate prior to discharge, with an appropriate treatment train. The magnitude of temporary operational drainage or maintenance activities on surface water quality is considered to be negligible. The effects to the Fromus (**minor** effects) and minor agricultural ditches (**negligible** effects) would therefore be **not significant.**

Surface Water Quantity and Geomorphology

12.8.150 Impacts to surface water quantity or geomorphology could occur from operational drainage or maintenance activities (which would have similar impacts to construction but assumed at a smaller scale).

12.8.151 The main receptors at the proposed Converter Station are the Fromus (Very high importance) and minor agricultural ditches (low importance). The receptors could be impacted by operational drainage discharges altering watercourse flows, or direct physical impacts during maintenance activities.

12.8.152 The drainage design for the permanent access track and Converter Station would follow SuDS principles to attenuate prior to discharge, with an appropriate treatment train. The magnitude of temporary operational drainage or maintenance activities on surface water quality is considered to be negligible. Based on the above, the effects to the Fromus (**minor** effects) and minor agricultural ditches (**negligible** effects) would therefore be **not significant.**

Groundwater Quality

12.8.153 Impacts to groundwater quality could occur from operational drainage or maintenance activities (which would have similar impacts to construction but

assumed at a smaller scale). Impacts as a result of mobilising existing contamination are covered in **Chapter 15 Geology and Contamination.**

12.8.154 The main receptors at the Converter Station are the hydraulically connected aquifers (medium to very high importance) and local abstractions and private water supplies (medium to high importance) which could be adversely impacted by operational drainage discharges or an accidental spillage during maintenance.

12.8.155 The drainage design for the proposed Converter Station would follow SuDS principles to attenuate and appropriately treat runoff prior to discharge. The magnitude of temporary operational maintenance activities on surface water quality is considered to be negligible with effects to the aquifers and local water resources **minor to negligible**, **not significant.**

Groundwater Quantity

12.8.156 Impacts to groundwater flows and levels could occur from operational drainage or maintenance activities (which would have similar impacts to construction but assumed at a smaller scale). Impacts as a result of mobilising existing contamination are covered in **Chapter 15 Geology and Contamination.**

12.8.157 The main receptors at the proposed Converter Station are the hydraulically connected aquifers (medium to very high importance) and local abstractions and private water supplies (medium to high importance) which could be impacted by operational drainage or maintenance activities altering groundwater levels and flows, and subsequently baseflow to dependent receptors.

12.8.158 The drainage design for the proposed Converter Station would follow SuDS principles to attenuate prior to discharge, taking into consideration mounding and groundwater flood risk. The magnitude of temporary operational maintenance activities on groundwater quantity is considered to be negligible. The effects to the aquifers and local water resources would therefore be **minor to negligible**, **not significant.**

Water Dependent Terrestrial Ecosystems

12.8.159 At this stage, no WDTEs have been identified in the area of the proposed Converter Station. The presence of non-designated WDTE will be assessed for the ES based on habitat mapping and survey data.

12.8.160 The magnitude of temporary operational maintenance activities on WDTE is considered to be negligible. Other impacts on the terrestrial ecosystems are assessed within **Chapter 8 Ecology and Biodiversity.**

12.8.161 The effects to non-designated WDTE of high importance would therefore be **minor**, **not significant.**

Flood Risk

12.8.162 **Appendix 12.1 Preliminary FRA** outlines the flood risk impacts to, and as a result of, the Proposed Onshore Scheme.

12.8.163 The proposed Converter Station includes areas of fluvial (crossing of the River Fromus) and pluvial flood risk.

12.8.164 Operational flood risk to the Proposed Onshore Scheme and as a result of the Proposed Onshore Scheme will be addressed through the bridge and drainage design. This includes the bridge been designed for flood levels/flows (taking into account climate change) and limiting runoff to greenfield rates to prevent effects outside of the Draft Order Limits.

12.8.165 With flood impacts designed out, the magnitude of impact of flooding to the Proposed Onshore Scheme and as a result of the Proposed Onshore Scheme is negligible.

12.8.166 The effects of flooding to the Proposed Onshore Scheme and effects outside of the Draft Order Limits as a result of the Proposed Onshore Scheme would therefore be **minor**, **not significant.**

Proposed Underground HVDC Cable Corridor

Surface Water and Groundwater

12.8.167 Operational impacts to surface water and groundwater (both quality and quantity) could occur from maintenance activities, which would have similar impacts to construction but assumed at a smaller scale.

12.8.168 The main receptors would be as during construction (see 12.8.70 and 12.8.78). The magnitude of temporary operational maintenance activities on surface water and groundwater is considered to be negligible with effects **minor**, **not significant.**

Water Dependent Terrestrial Ecosystems

12.8.169 The Minsmere-Walberswick Heath and Marshes SSSI (a very high importance GWDTE) is within the study area of the HVDC and crossed to the west of Walberswick.

12.8.170 At this stage, no non-designated WDTEs have been identified in the study area of the HVDC. The presence of non-designated WDTE will be assessed for the ES based on habitat mapping and survey data. The magnitude of temporary operational maintenance activities on WDTE is considered to be negligible with effects to non-designated WDTE of high importance **minor**, **not significant.**

Flood Risk

12.8.171 **Appendix 12.1 Preliminary FRA** outlines the flood risk impacts to, and as a result of, the Proposed Onshore Scheme.

12.8.172 Following construction, the embedded design measures will result in no adverse change in flood risk from the baseline condition.

12.8.173 With operational flood impacts designed out, the magnitude of impact of flooding to the Proposed Onshore Scheme and as a result of the Proposed Onshore Scheme is negligible.

12.8.174 The effects of flooding to the Proposed Onshore Scheme and effects outside of the Draft Order Limits as a result of the Proposed Onshore Scheme would therefore be **minor**, **not significant.**

Proposed Landfall Site

Surface Water Quality

12.8.175 Operational impacts to surface water quality could occur from operational drainage or maintenance activities (which would have similar impacts to construction but assumed at a smaller scale).

12.8.176 The main receptors at the Proposed Landfall are minor agricultural ditches (low importance) and Dunwich River (high importance) which is downgradient of the proposed Landfall and crossed by the HDD coming onshore (at depth to be determines by investigations during detailed design).

12.8.177 The drainage design for the Proposed Landfall would follow SuDS principles to attenuate and appropriately treat runoff prior to discharge.

12.8.178 The magnitude of temporary operational maintenance activities on surface water quality is considered to be negligible. The effects to the Dunwich River (**minor** effects) and minor agricultural ditches (**negligible** effects) would therefore be **not significant.**

Surface Water Quantity and Geomorphology

12.8.179 Impacts to surface water quantity or geomorphology could occur from operational drainage or maintenance activities (which would have similar impacts to construction but assumed at a smaller scale).

12.8.180 The main receptors at the Proposed Landfall are minor agricultural ditches (low importance) and Dunwich River (high importance) which is downgradient of the proposed Landfall and crossed by the HDD coming onshore (at depth to be determines by investigations during detailed design).

12.8.181 The drainage design for the Proposed Landfall would follow SuDS principles to attenuate to greenfield runoff rates prior to discharge.

12.8.182 The magnitude of temporary operational maintenance activities on surface water quality is considered to be negligible. The effects to the Dunwich River (**minor** effects) and minor agricultural ditches (**negligible** effects) would therefore be **not significant.**

Groundwater Quality

12.8.183 Impacts to groundwater quality could occur from operational drainage or maintenance activities (which would have similar impacts to construction but

assumed at a smaller scale). Impacts as a result of mobilising existing contamination are covered in **Chapter 15 Geology and Contamination.**

12.8.184 The main receptors at the Proposed Landfall are the hydraulically connected aquifers (medium to very high importance).

12.8.185 The drainage design for the Proposed Landfall would follow SuDS principles to attenuate and appropriately treat runoff prior to discharge.

12.8.186 The magnitude of temporary operational maintenance activities on surface water quality is considered to be negligible. The effects to the aquifers would therefore be **minor to negligible**, **not significant.**

Groundwater Quantity

12.8.187 Impacts to groundwater flows and levels could occur from operational drainage or maintenance activities (which would have similar impacts to construction but assumed at a smaller scale). Impacts as a result of mobilising existing contamination are covered in **Chapter 15 Geology and Contamination.**

12.8.188 The main receptors at the Proposed Landfall are the hydraulically connected aquifers (medium to very high importance) which could be impacted by operational drainage or maintenance activities altering groundwater levels and flows, and subsequently baseflow to dependent receptors.

12.8.189 The drainage design for the Proposed Landfall would follow SuDS principles to attenuate prior to discharge, taking into consideration mounding and groundwater flood risk.

12.8.190 The magnitude of temporary operational maintenance activities on groundwater quantity is considered to be negligible. The effects to the aquifers would therefore be **minor to negligible**, **not significant.**

Water Dependent Terrestrial Ecosystems

12.8.191 The Minsmere-Walberswick Heath and Marshes SSSI (a very high importance GWDTE) is within the study area of the proposed Underground HVDC Cable Corridor and crossed to the south-east of the proposed Landfall as the proposed Underground Cables come onshore.

12.8.192 At this stage, no non-designated WDTEs have been identified in the study area of the HVDC. The presence of non-designated WDTE will be assessed for the ES based on habitat mapping and survey data.

12.8.193 The magnitude of temporary operational maintenance activities on WDTE is considered to be negligible. Other impacts on the terrestrial ecosystems are assessed within **Chapter 8 Ecology and Biodiversity.**

12.8.194 The effects to the Minsmere-Walberswick Heath and Marshes GWDTE of very high importance and non-designated WDTE of high importance would therefore be **minor**, **not significant.**

Flood Risk

12.8.195 **Appendix 12.1 Preliminary FRA** outlines the flood risk impacts to, and as a result of, the Proposed Onshore Scheme.

12.8.196 Following construction, the embedded design measures will result in no adverse change in flood risk from the baseline condition.

12.8.197 With operational flood impacts designed out, the magnitude of impact of flooding to the Proposed Onshore Scheme and as a result of the Proposed Onshore Scheme is negligible.

12.8.198 The effects of flooding to the Proposed Onshore Scheme and effects outside of the Draft Order Limits as a result of the Proposed Onshore Scheme would therefore be **minor**, **not significant.**

Decommissioning

12.8.199 During decommissioning, key activities with the potential to impact on hydrology, hydrogeology and drainage are the establishment and use of temporary compounds, the dismantling and demolition of the proposed Converter Station and proposed Kiln Lane Substation, and the potential for removal and recycling of the proposed Underground Cables (if not left in situ).

12.8.200 The receptors with the potential to be affected are common to the construction phase of the Proposed Onshore Scheme and the magnitudes of impacts would be similar to or lesser than those described for the construction of the Proposed Onshore Scheme.

12.8.201 All decommissioning activities would be expected to take place in accordance with the relevant environmental permitting regime, and in accordance with all good practice control and management measures. As such, effects associated with decommissioning of the Proposed Onshore Scheme are **not significant.**

12.9 Mitigation, monitoring and enhancement

12.9.1 Mitigation types are defined in **Chapter 5 EIA Approach and Methodology** of this PEIR, with embedded control measures for Hydrology, Hydrogeology and Drainage being presented in **Section 12.7** of this chapter.

Additional mitigation and enhancement

12.9.2 The assessment has concluded that there are no likely significant effects in relation to hydrology, hydrogeology and drainage. Therefore, no additional mitigation measures are required beyond the **Design Principles (published as part of Statutory Consultation)**, and good practice control measures and commitments set out in **Appendix 2.1 Outline Onshore CoCP.**

Monitoring

12.9.3 There are no likely significant adverse effects related to the Hydrology, Hydrogeology and Drainage assessment identified either during construction, operation and maintenance, or decommissioning of the Proposed Onshore that require monitoring.

Enhancement

12.9.4 Opportunities for enhancement will be explored as part of design development and outlined in the Environmental Statement and DCO application submission.

12.10 Summary of residual effects

12.10.1 **Table 12.12** and **Table 12.13** provides a summary of the residual effects relating to the construction, operation and maintenance, and decommissioning of the Proposed Onshore Scheme with regard to Hydrology, Hydrogeology and Drainage receptors.

12.10.2 The assessment presented in **Section 12.8** has concluded that residual significant effects are not likely in relation to hydrology, hydrogeology and drainage across all project phases.

Table 12.12: Summary of assessment of likely significant effects during construction (and decommissioning)

Receptor	Environmental effect without further mitigation	Additional Mitigation	Residual effect
Surface water Quality, Quantity and Geomorphology			
Fromus and tributaries having a WFD classification shown in a RBMP	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Hundred River and tributaries having a WFD classification shown in a RBMP	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Minsmere Old River and tributaries having a WFD classification shown in a RBMP	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Blyth (d/s Halesworth) and tributaries having a WFD classification shown in a RBMP	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Main rivers not having a WFD classification shown in a RBMP (Friston River and Dunwich River)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**

Receptor	Environmental effect without further mitigation	Additional Mitigation	Residual effect
Ordinary Watercourses not having a WFD classification shown in a RBMP	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Minor agricultural drains	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Licensed Abstractions (see **Appendix 12.3**)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Consented Discharges (see **Appendix 12.3**)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Groundwater Quality and Quantity			
Waveney and East Suffolk Chalk and Crag water Body – Crag (Principal Aquifer)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Peat (Secondary undifferentiated)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Alluvium (Secondary A)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Tidal Flat Deposits (Unproductive)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Head (Secondary undifferentiated)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Lowestoft Formation – Diamicton (Secondary undifferentiated)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Lowestoft Formation – Clays and Silts (Secondary B)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Lowestoft Formation – Sands and Gravels (Secondary A)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Groundwater-surface water interactions including springs (Mapped and unmapped)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Licensed Abstractions (see **Appendix 12.3**)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**

Receptor	Environmental effect without further mitigation	Additional Mitigation	Residual effect
Private Water Supplies (see **Appendix 12.3**)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Consented Discharges (see **Appendix 12.3**)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
WDTEs			
Minsmere-Walberswick Heath and Meadows GWDTE	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Non-designated WDTE	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Flood Risk			
Proposed Onshore Scheme	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Areas within the study area outside of the Draft Order Limits	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**

Table 12.13: Summary of assessment of likely significant effects during operation and maintenance

Receptor	Environmental effect without further mitigation	Additional Mitigation	Residual effect
Surface water Quality, Quantity and Geomorphology			
Fromus and tributaries having a WFD classification shown in a RBMP	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Hundred River and tributaries having a WFD classification shown in a RBMP	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Minsmere Old River and tributaries having a WFD classification shown in a RBMP	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**

Receptor	Environmental effect without further mitigation	Additional Mitigation	Residual effect
Blyth (d/s Halesworth) and tributaries having a WFD classification shown in a RBMP	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Main rivers not having a WFD classification shown in a RBMP (Friston River and Dunwich River)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Ordinary Watercourses not having a WFD classification shown in a RBMP	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Minor agricultural drains	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Licensed Abstractions (see **Appendix 12.3**)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Consented Discharges (see **Appendix 12.3**)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Groundwater Quality and Quantity			
Waveney and East Suffolk Chalk and Crag water Body – Crag (Principal Aquifer)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Peat (Secondary undifferentiated)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Alluvium (Secondary A)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Tidal Flat Deposits (Unproductive)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Head (Secondary undifferentiated)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**

Receptor	Environmental effect without further mitigation	Additional Mitigation	Residual effect
Lowestoft Formation – Diamicton (Secondary undifferentiated)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Lowestoft Formation – Clays and Silts (Secondary B)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Lowestoft Formation – Sands and Gravels (Secondary A)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Groundwater-surface water interactions including springs (Mapped and unmapped)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Licensed Abstractions (see **Appendix 12.3**)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Private Water Supplies (see **Appendix 12.3**)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Consented Discharges (see **Appendix 12.3**)	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
WDTEs			
Minsmere-Walberswick Heath and Meadows GWDTE	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Non-designated WDTE	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Flood Risk			
Proposed Onshore Scheme	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**
Areas within the study area outside of the Draft Order Limits	Effects not significant on basis of embedded design and control measures	Not required	**Not significant**

12.11 Monitoring

12.11.1 As set out in **Appendix 2.1 Outline Onshore CoCP,** monitoring systems will be employed during the construction works to verify impacts and ensure compliance with any licences or permits obtained.

12.11.2 The principal contractor will consult the Environment Agency regarding water quality, flow and level monitoring to be undertaken for watercourses and groundwater that will be affected by construction works or discharge of surface water runoff, which will include the following, as appropriate:

a. pre-construction monitoring to establish baseline water quality conditions for watercourses and groundwater;
b. monitoring during construction works to enable the effectiveness of embedded mitigation and control measures to limit pollution risk to be monitored and any pollution incidents to be identified; and
c. monitoring of watercourses or groundwater receiving surface water runoff during construction to enable effective treatment and other sustainable drainage systems measures to be determined and to ensure that an unacceptable rise in groundwater levels does not occur.

12.11.3 Any monitoring and groundwater control installations will be appropriately capped and secured during monitoring and decommissioned in line with best practice guidance on completion.

Topic Glossary and Abbreviations

Term	Definition
Arterial Watercourse	Internal Drainage Boards often carry out water level management responsibilities through the designation of Ordinary Watercourses as 'arterial watercourses' also known as 'main drains' or 'adopted watercourses'. The status of arterial watercourse is an acknowledgement by the IDB that the watercourse is of arterial importance to the Internal Drainage District and normally will receive maintenance from the IDB.
Foul Water	Also known as wastewater or sewage, refers to water that is contaminated with human waste, food particles and other organic matter; typically from domestic and commercial sources.
Groundwater	Groundwater is water present beneath the earth's surface in soil and rock pore spaces and within fractures
Main River	Usually larger rivers and streams, which are designated by the Environment Agency as 'Main Rivers'. The Environment Agency carries out maintenance, improvement or construction work on main rivers to manage flood risk.
Ordinary Watercourses	Non-main rivers are called 'Ordinary Watercourses'. Lead local flood authorities, district councils and internal drainage boards carry out flood risk management work on ordinary watercourses.
Principal Aquifer	Principal aquifers are designated by the Environment Agency as strategically important rock units that have high permeability and water storage capacity
Secondary A Aquifer	Secondary A aquifers comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers
Secondary B Aquifer	Secondary B aquifers are mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers
Secondary (undifferentiated) Aquifer	Secondary undifferentiated are aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value.
Sequential Test	The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding. It should demonstrate that there are no reasonably available sites in areas with a lower probability of flooding from any source that would be appropriate to the type of development proposed.
Source Protection Zone	The Environment Agency has defined Source Protection Zones (SPZ) to show the level of risk to a source (such as a well or borehole) from contamination. SPZs are split into three main zones, with SPZ1 being closest to the source and at highest risk from contamination: • Inner – SPZ1

Term	Definition
	• Outer – SPZ2; and • Total Catchment – SPZ3 Note that SPZ1, 2 and 3 are sometimes referred to as SPZ I, SPZ II and SPZ III.
Surface Water	Surface water refers to bodies of liquid water that exist on the Earth's surface. This includes oceans seas, rivers, canals, lakes, pond and streams, together with water present on man-made structures (such as roof and road run-off). Water that is not groundwater (beneath the surface).
AEP	Annual Exceedance Probability
EA	Environment Agency
EDPR	Environmental Damage (Prevention and Remediation) Regulations
EPR	Environmental Permitting Regulations
ExA	Examining Authority
FRA	Flood Risk Assessment
FRAP	Flood Risk Activity Permit
GW	Groundwater
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IDB	Internal Drainage Board
LLFA	Lead Local Flood Authority
Outline Onshore CoCP	Outline Onshore Code of Construction Practice
PWS	Private Water Supply
SPZ	Source Protection Zone
SFFA	Salmon and Freshwater Fisheries Act
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
RBMP	River Basin Management Plan
WDTE	Water Dependent Terrestrial Ecosystems
WER	Water Environment Regulations
WFD	Water Framework Directive

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