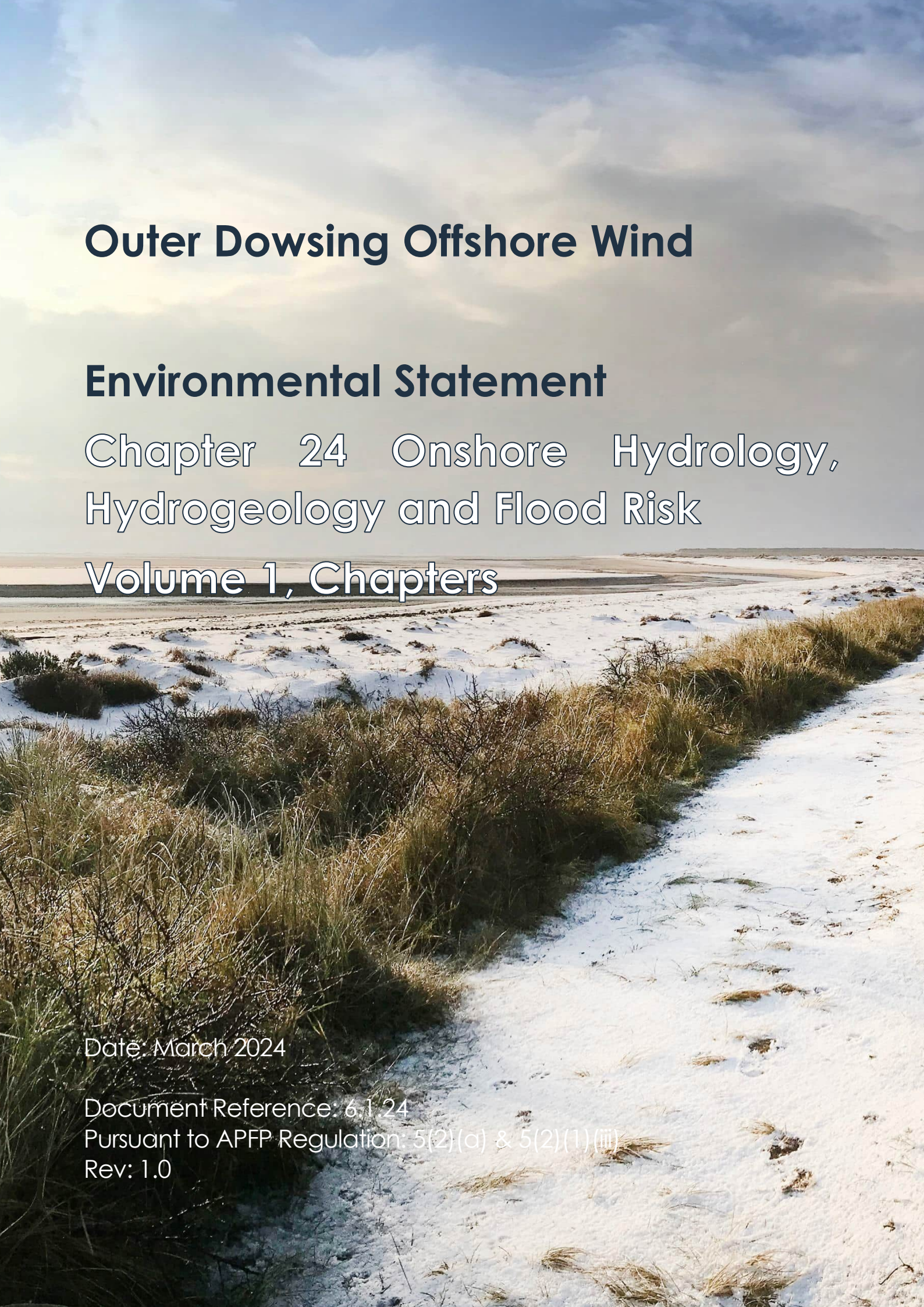

Outer Dowsing Offshore Wind

Environmental Statement

Chapter 24 Onshore Hydrology, Hydrogeology and Flood Risk

Volume 1, Chapters

Date: March 2024

Document Reference: 6.1.24
Pursuant to APFP Regulation: 5(2)(a) & 5(2)(1)(iii)
Rev: 1.0

Company:	**Outer Dowsing Offshore Wind**	Asset:	**Whole Asset**
Project:	**Whole Wind Farm**	Sub Project/Package:	Whole Asset
Document Title or Description:	Chapter 24 Onshore Hydrology, Hydrogeology and Flood Risk		
Internal Document Number:	PP1-ODOW-DEV-CS-REP-0132	3rd Party Doc No (If applicable):	N/A

Rev No.	Date	Status / Reason for Issue	Author	Checked by	Reviewed by	Approved by
1.0	March 2024	DCO Application	SLR	GoBe	Shepherd and Wedderburn	Outer Dowsing

Table of Contents

Table of Tables

Table of Figures (Volume 2)

- Figure 24.4 Watercourses and Flood Zones (document reference 6.2.24.4)
- Figure 24.5 Aquifer Designations, Source Protection Zones, Abstraction and Discharge Locations (document reference 6.2.24.5)

Table of Appendices (Volume 3)

- Appendix 24.1 Groundwater Risk Assessment (document reference 6.3.24.1)
- Appendix 24.2 Flood Risk Assessment: Onshore ECC and 400kV Cable Corridor (document reference 6.3.24.2)
- Appendix 24.3 Flood Risk Assessment Onshore Substation (document reference 6.3.24.3)

Acronyms & Terminology

Abbreviations / Acronyms

Abbreviation / Acronym	Description
AEP	Annual Exceedance Probability
AIS	Air Insulated Switchgear
BGS	British Geological Survey
BSIDB	Black Sluice Internal Drainage Board
CIRIA	Construction Industry Research and Information Association
CEA	Cumulative Effects Assessment
CMS	Construction Method Statement
CoCP	Code of Construction Practice
DESNZ	Department of Energy Security and Net Zero
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
FRA	Flood Risk Assessment
GIS	Gas Insulated Switchgear
GT R4 Ltd	The Applicant. The special project vehicle created in partnership between Corio Generation (a wholly owned Green Investment Group portfolio company), Gulf Energy Development and TotalEnergies.
GWD	Groundwater Directive
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
IDB	Internal Drainage Board
LCRM	Land Contamination Risk Management
LLFA	Lead Local Flood Authority
LMDB	Lindsey Marsh Drainage Board
LNR	Local Nature Reserve
LRB	Landscape Recovery Bid
LWS	Local Wildlife Site
MDS	Maximum Design Scenario
MHWS	Mean High Water Springs
NGSS	National Grid Onshore Substation
NGESO	National Grid Electrical System Operator
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
ODOW	Outer Dowsing Offshore Windfarm

Abbreviation / Acronym	Description
OnSS	Onshore Substation
PEIR	Preliminary Environmental Information Report
PPEIRP	Pollution Prevention and Emergency Incident Response Plan
PPG	Planning Practice Guidance
RBMP	River Basin Management Plans
RBWD	Revised Bathing Waters Directive
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SFRA	Strategic Flood Risk Assessment
SHIDB	South Holland Internal Drainage Board
SMP	Shoreline Management Plans
SoS	Secretary of State
SoCG	Statement of Common Ground
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
TCC	Temporary Construction Compound
TJB	Transition Joint Bay
WFD	Water Framework Directive
WDIDB	Welland and Deepings Internal Drainage Board
W4IDB	Witham Fourth District Internal Drainage Board

Terminology

Term	Definition
400kV cables	High-voltage cables linking the OnSS to the NGSS.
400kV cable corridor	The 400kV cable corridor is the area within which the 400kV cables connecting the onshore substation to the NGSS will be situated.
The Applicant	GT R4 Ltd. The Applicant making the application for a DCO. The Applicant is GT R4 Limited (a joint venture between Corio Generation, TotalEnergies and Gulf Energy Development (GULF)), trading as Outer Dowsing Offshore Wind. The project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company), TotalEnergies and GULF.
Baseline	The status of the environment at the time of the assessment without the development in place.
Cable Circuit	A number of electrical conductors necessary to transmit electricity between two points bundled as one cable or taking the form of separate cables, and may include one or more auxiliary cables (normally fibre optic cables).
Connection Area	An indicative search area for the NGSS
Cumulative effects	The combined effect of the project acting additively with the effects of other developments, on the same single receptor/resource.
Cumulative impacts	Impacts that result from changes caused by other past, present or reasonably foreseeable actions together with the Project.

Term	Definition
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS) for Department for Energy Security and Net Zero (DESNZ).
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of an impact with the sensitivity of a receptor, in accordance with defined significance criteria.
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Regulations, including the publication of an Environmental Statement (ES).
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
Environmental Statement (ES)	The suite of documents that detail the processes and results of the EIA.
Export Cables	High voltage cables which transmit power from the Offshore Substations (OSS) to the Onshore Substation (OnSS) via an Offshore Reactive Compensation Platform (ORCP) if required, which may include one or more auxiliary cables (normally fibre optic cables).
Haul Road	The track within the onshore ECC which the construction traffic would use to facilitate construction.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Joint Bays	An excavation formed with a buried concrete slab at sufficient depth to enable the jointing of high voltage power cables.
Landfall	The location at the land-sea interface where the offshore export cables and fibre optic cables will come ashore.
Link boxes	Underground metal chamber placed within a plastic and/or concrete pit where the metal sheaths between adjacent export cable sections are connected and earthed.
Maximum Design Scenario	The maximum design parameters, or a combination of project design parameters that are likely to result in the greatest potential for change in relation to each impact assessed.
Mitigation	Mitigation measures are commitments made by the Project to reduce and/or eliminate the potential for significant effects to arise as a result of the Project. Mitigation measures can be embedded (part of the project design) or secondarily added to reduce impacts in the case of potentially significant effects.
National Grid Onshore Substation (NGSS)	The National Grid substation and associated enabling works to be developed by the National Grid Electricity Transmission (NGET) into which the Project's 400kV Cables would connect.
National Policy Statement (NPS)	A document setting out national policy against which proposals for Nationally Significant Infrastructure Projects (NSIPs) will be assessed and decided upon.
Onshore Infrastructure	The combined name for all onshore infrastructure associated with the Project from landfall to grid connection.
Onshore Substation (OnSS)	The Project's onshore HVAC substation, containing electrical equipment, control buildings, lightning protection masts, communications masts,

Term	Definition
	access, fencing and other associated equipment, structures or buildings; to enable connection to the National Grid.
Outer Dowsing Offshore Wind (ODOW)	The Project.
Order Limits	The area subject to the application for development consent, including all permanent and temporary works for Outer Dowsing Offshore Wind.
Pre-construction and post-construction	The phases of the Project before and after construction takes place.
Preliminary Environmental Information Report (PEIR)	The PEIR was written in the style of a draft Environmental Statement (ES) and provided information to support and inform the statutory consultation process in the pre-application phase. Following that consultation, the PEIR documentation has been updated to produce the Project's ES that accompanies the application for the Development Consent Order (DCO).
Project Design Envelope	A description of the range of possible elements that make up the Project's design options under consideration, as set out in detail in the project description. This envelope is used to define the Project for Environmental Impact Assessment (EIA) purposes when the exact engineering parameters are not yet known. This is also often referred to as the "Rochdale Envelope" approach.
The Planning Inspectorate	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects (NSIPs).
The Project	Outer Dowsing Offshore Wind, an offshore wind generating station together with associated onshore and offshore infrastructure.
Receptor	A distinct part of the environment on which effects could occur and can be the subject of specific assessments. Examples of receptors include species (or groups) of animals or plants, people (often categorised further such as 'residential' or those using areas for amenity or recreation), watercourses etc.
Statement of Common Ground	A statement of common ground is a written statement produced jointly between The Applicant and another Interested Party setting out the areas of agreement and /or disagreement between parties.
Statutory consultee	Organisations that are required to be consulted by the Applicant, the Local Planning Authorities and/or The Planning Inspectorate during the pre-application and/or examination phases, and who also have a statutory responsibility in some form that may be relevant to the Project and the DCO application. This includes those bodies and interests prescribed under Section 42 of the Planning Act 2008.
Study area	Area(s) within which environmental impact may occur – to be defined on a receptor-by-receptor basis by the relevant technical specialist.
Transition Joint Bay (TJB)	The offshore and onshore cable circuits are jointed on the landward side of the sea defences/beach in Transition Joint Bay (TJB). The TJB is an underground chamber constructed of reinforced concrete which provides a secure and stable environment for the cable.

Term	Definition
Trenchless technique	Trenchless technology is an underground construction method of installing, repairing and renewing underground pipes, ducts and cables using techniques which minimize or eliminate the need for excavation. Trenchless technologies involve methods of new pipe installation with minimum surface and environmental disruptions. These techniques may include Horizontal Directional Drilling (HDD), thrust boring, auger boring, and pipe ramming, which allow ducts to be installed under an obstruction without breaking open the ground and digging a trench.

Reference Documentation

Document Number	Title
6.1.3	Project Description
6.1.5	EIA Methodology
6.1.6	Technical Consultation
6.1.8	Marine Water and Sediment Quality
6.1.21	Onshore Ecology
6.1.22	Onshore Ornithology
6.1.23	Geology and Ground Conditions
6.3.3.3	Onshore Crossing Schedule
6.3.5.3	Onshore Cumulative Effects Assessment Approach
6.3.8.1	Water Framework Directive Assessment
6.3.24.1	Groundwater Risk Assessment
6.3.24.2	Flood Risk Assessment: Onshore ECC and 400kV Cable Corridor
6.3.24.3	Flood Risk Assessment: Onshore Substation
8.1	Outline Code of Construction Practice
8.1.3	Outline Soil Management Plan
8.1.4	Outline Onshore Pollution Prevention and Emergency Incident Response Plan
8.1.5	Outline Surface Water and Drainage Strategy
8.12	Outline Operational Drainage Management Plan

24 Onshore Hydrology, Hydrogeology, and Flood Risk

24.1 Introduction

1. This chapter of the Environmental Statement (ES) presents the Environmental Impact Assessment (EIA) process and results, for the potential impacts of Outer Dowsing Offshore Wind ("the Project") on Onshore Hydrology, Hydrogeology and Flood Risk. This chapter considers the potential impact of the Project landward of Mean Low Water Springs (LHWS) during the construction, operation and maintenance, and decommissioning phases. The Project is a Nationally Significant Infrastructure Project (NSIP). An EIA is provided as part of the Development Consent Order (DCO) application under the Planning Act 2008.
2. The Project will include both offshore and onshore infrastructure including an offshore generating station (windfarm) located approximately 54km from the Lincolnshire coastline, export cables to landfall, onshore cables, an onshore substation, connection to the electricity transmission network, and ancillary and associated development (see Volume 1, Chapter 3: Project Description 6.1.3 for full details (document reference 6.1.3)).
3. This chapter is supported by the information contained within the following appendices and outline documents:
   - Volume 3, Appendix 3.3 Onshore Crossing Schedule (document reference 6.3.3.3);
   - Volume 3, Appendix 24.1: Groundwater Risk Assessment (document reference 6.3.24.1);
   - Volume 3, Appendix 24.2: Flood Risk Assessment: Onshore ECC and 400kV cable corridor (document reference 6.3.24.2);
   - Volume 3, Appendix 24.3: Flood Risk Assessment: Onshore Substation (document reference 6.3.24.3;
   - Volume 3, Appendix 8.1: Water Framework Directive Assessment (document reference 6.3.8.1);
   - Outline Code of Construction Practice (CoCP) (document reference 8.1), including:
     - Outline Soil Management Plan (SMP) (document reference 8.1.3);
     - Outline Onshore Pollution Prevention and Emergency Incident Response Plan (PPEIRP) (document reference 8.1.4); and
     - Outline Surface Water and Drainage Strategy (document reference 8.1.5).
   - Outline Operational Drainage Management Plan (document Reference 8.12).
4. This chapter should be read alongside the following Volume 1 chapters:
   - Chapter 3: Project Description (document reference 6.1.3);
   - Chapter 5: EIA Methodology (document reference 6.1.5);
   - Chapter 8: Marine Water and Sediment Quality (document reference 6.1.8);
   - Chapter 21: Onshore Ecology (document reference 6.1.21);

- Chapter 22: Onshore Ornithology (document reference 6.1.22);
- Chapter 23: Geology and Ground Conditions (document reference 6.1.23);

5. This hydrology, hydrogeology, and flood risk chapter:
   - Describes the existing baseline established from desk studies, dedicated surveys and consultation;
   - Outlines the potential environmental effects on hydrology, hydrogeology and flood risk arising from the onshore elements of the Project, based on the information gathered and the analysis and assessments undertaken to date and assesses whether they are significant (in EIA terms);
   - Identifies any assumptions and limitations encountered in compiling the environmental information; and
   - Highlights any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce, or offset the possible environmental effects identified at the relevant stage in the EIA process.

24.2 Statutory and Policy Context

6. Regard will be given to legislation, policy, technical guidance and other codes of best practice during the design phase of the development, in order to limit;
   - The potential for contamination of surface waters or groundwater;
   - The potential for flooding to be caused to the existing water environment and surrounding sensitive users; and
   - Other potential impacts on water users or water dependant environment.
7. The hydrology, hydrogeology and flood risk impact assessment has been undertaken in accordance with the following legislation and policy.

24.2.1 European Legislation

8. The Water Framework Directive (2000/60/EC) (the WFD) provides the foundation for the protection of the UK's water environment. The WFD seeks to protect all elements of the water cycle and to enhance the quality of groundwater, surface waters, estuaries, and coastal waters. The Directive was transposed and implemented within England through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Appendix 8.1: Water Framework Directive Compliance Assessment (document reference 6.3.8.1) also makes reference to the WFD in assessment of the offshore water environment.
9. The Groundwater Directive (2006/118/EC, including amendments to Annex II detailed under Directive 2014/80/EU) (the GWD) is designed to combat groundwater pollution and sets out procedures for assessing quality of groundwater. Aspects of the GWD are transposed and implemented through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and the Environmental Permitting (England and Wales) Regulations 2016.

10. The Floods Directive (2007/60/EC) requires assessment of all watercourses and coastlines to determine risk of flooding and action to take adequate and coordinated measures to reduce this flood risk. The Flood Risk Regulations 2009 transpose the EU Floods Directive into law in England and Wales.
11. The revised Bathing Water Directive (rBWD) (2006/7/EC) came into force in March 2006. The rBWD has been implemented in England and Wales via the Bathing Water Regulations 2013 (as amended), with Bathing Waters classified against the standards set by the rBWD since 2015. The rBWD provides more stringent standards than the previous Directive and places an emphasis on providing information to the public.

24.2.2 National Legislation

12. The objectives of the directives discussed above that are relevant to this assessment are met through the following UK legislation, relevant to the protection of the water environment.

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 transposes the Water Framework Directive (WFD) and aspects of the GWD into UK legislation;
- The Environmental Permitting (England and Wales) Regulations 2016 consolidate and replace the Environmental Permitting (England and Wales) Regulations 2010, which have been regularly amended since original publication. The 2016 Regulations are still in force and are the main implementing regulations for the environmental permitting regime;
- The Groundwater (England and Wales) Regulations 2009 which implemented Article 6 of the GWD were repealed by the Environmental Permitting (England and Wales) Regulations 2010, and then consolidated by the Environmental Permitting (England and Wales) Regulations 2016, which detail measures to prevent or limit inputs of pollutants into groundwater;
- The Flood Risk Regulations 2009 transposes the EU Floods Directive into UK legislation and sets out requirements of the Environment Agency (EA) and local authorities in preparing assessments and mapping of flood risk for each river basin district in England and Wales;
- Flood and Water Management Act 2010 includes provision for the management of risk in connection with flooding and sets out requirements for Lead Local Flood Authorities (LLFA) in preparing strategies for local flood risk management;
- The Water Resources Act 1991 regulates water resources, water quality and flood defence. The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009, made changes to the powers for carrying out anti-pollution works and serving notices, which are set out in sections 161 to 161AB of the Water Resources Act 1991;
- The Land Drainage Act 1991 and The Land Drainage Act 1994 sets out requirements for maintenance of watercourses by riparian owners;
- Environment Act, 1995 sets out roles and responsibilities for the EA;
- The Private Water Supplies (England) (Amendment) Regulations 2018 amend the Private Water Supplies (England) Regulations 2016. The Regulations transpose requirements of European Law on the quality of water intended for human consumption from private abstractions; and

- Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 set out the key stages in the assessment process, including review and monitoring.

24.2.3 National and Local Planning Policy

13. Planning policy on offshore renewable energy Nationally Significant Infrastructure Projects (NSIPs), specifically in relation to hydrology, hydrogeology and flood risk, is contained in the National Policy Statements (NPSs) for Overarching Energy (EN-1, November 2023), Renewable Energy Infrastructure (EN-3, November 2023) and Electricity Networks Infrastructure (EN-5, November 2023). The principal guidance for the proposals is that provided by the NPSs, together with National Planning Policy Framework (NPPF) and local development plan policies, which provide additional relevant context.
14. The NPSs identify a number of issues relevant to this chapter. The policies of particular relevance to hydrology, hydrogeology and flood risk from NPS EN-1 and NPS EN-3 are summarised in Table 24.1 below.
15. Guidance in relation to renewable energy projects is provided within NPS EN-3. For offshore windfarms, this document focuses primarily on the offshore elements of the Project. In relation to flood risk, NPS EN3 refers to NPS EN-1, Section 4.8.
16. Guidance in relation to the scope of assessment required is provided within NPS EN-3. Assessment should be undertaken for all stages of the lifespan of the proposed windfarm (paragraph 2.6.190 of NPS EN-3).
17. Guidance specifically relating to onshore grid connections and climate change adaption is provided in NPS EN-5. In relation to flood risk, NPS EN 5 refers to NPS EN-1, Section 4.8.

24.2.3.1 National Planning Policy Framework

18. The National Planning Policy Framework (NPPF), prepared by the Department for Communities and Local Government was published in March 2012 and revised in December 2023. Chapter 14 of the NPPF, Meeting the challenge of climate change, flooding and coastal change, along with the National Planning Practice Guidance (PPG) which expands on policies contained in the NPPF, recommends a proactive strategy to mitigate and adapt to climate change and requires that flood risk, sustainability, and water quality are considered. In addition, the NPPF requires that account is taken of the potential for pollution arising from previous use of the land when determining suitability for a proposed use. NPPF informs Section 5.7 Flood Risk of the Overarching National Planning Policy Statement for Energy (EN-1).
19. Chapter 15 of the NPPF, Conserving and enhancing the natural environment, along with guidance contained within PPG requires that account is taken of the potential for impact on water quality (in relation to water supply and the natural environment) and local hydrological regimes. NPPF informs section 5.15 Water Quality and Resources of the Overarching National Planning Policy Statement for Energy (EN-1).
20. The relevant legislation and planning policy for offshore renewable energy Nationally Significant Infrastructure Projects (NSIPs), specifically in relation to hydrology, hydrogeology, and flood risk, is outlined in Table 24.1 below.

Table 24.1 Legislation and policy context

Legislation/ policy	Key provisions	Section where comment addressed
National Policy Statement for Overarching Energy (NPS EN-1) (November 2023)	Paragraphs 4.10.10 - 4.10.11 require that applicants should assess the impacts on and from their proposed energy project across a range of climate change scenarios, in line with appropriate expert advice and guidance available at the time. Applicants should be able to demonstrate that proposals have a high level of climate resilience built-in from the outset. They should also be able to 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.	The characterisation of the flood risk baseline and future baseline has been established using the Environment Agency Flood Map for Planning, the local authority Strategic Flood Risk Assessments (SFRA) and data from hydraulic models, which take into account climate change effects. This information is contained in this chapter and is also contained within the Onshore Substation (OnSS) Flood Risk (FRA) (document reference: 6.3.24.3) and the onshore Export Cable Corridor (ECC) FRA (document reference: 6.3.24.2). Flood risk has been considered for the life of the development in Section 24.7.
	Paragraphs 5.8.13 – 5.8.15 require that applications for energy projects of 1ha or greater in Flood Zone 1 and all energy projects located in Flood Zones 2 and 3 should be accompanied by a site-specific FRA. Assessment may also be required where flooding issues other than from rivers and the sea (for example from surface water), or where the EA, Drainage Board or other body have indicated that there may be drainage problems. The FRA should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account. The minimum requirements for what should be included in an FRA are also outlined at paragraph 5.8.15 and requires an FRA to be proportionate to the risk and appropriate to the scale, nature and location of the project, and consider the risk of flooding arising from	FRA reporting has been undertaken, compliant to NPS EN-1, paragraph 5.7.5: provided in document reference: 6.3.24.2 and 6.3.24.3. Surface water management has been addressed during the construction phase within an Outline Surface Water and Drainage Strategy (document reference: 8.1.5) provided as part of the Outline CoCP (document reference 8.1). Surface water management during the operational phase of the OnSS has been addressed within an Outline Operational Drainage Management Plan (document reference 8.12).

Legislation/ policy	Key provisions	Section where comment addressed
	the project in addition to the risk of flooding to the project.	
	Paragraphs 5.8.18 – 5.8.20 require applicants to hold pre-application discussions before the official pre-application stage of the NSIP process with the Environment Agency and any other relevant bodies. Any concerns in regard to flood risk should be discussed all reasonable steps to agree ways in which the proposal might be amended, or additional information provided, which would alleviate concerns.	Consultation with the Environment Agency has been undertaken as part of the Project Evidence Plan (Hydrology and Flood Risk Expert Topic Group (ETG)) process, as set out in Section 24.3.
	Paragraph 5.8.36 lists the matters which the Secretary of State (SoS) should be satisfied by when determining an application for development consent, including where relevant: an FRA; application and satisfaction of the sequential test as part of the site selection; sequential approach at the site level to minimise risk; the proposal is in line with relevant national and local flood risk management strategies; Sustainable Drainage Systems (SuDS) have been used unless there is clear evidence that their use would be inappropriate; in flood risk areas the proposal development remains safe and operational during its lifetime without increasing flood risk elsewhere; that safe access/escape routes are included where required as part of an emergency plan; any residual risk can be safely managed over the lifetime of the development and land needed for future flood risk management is safeguarded.	FRA reporting (document ref: 6.3.24.2 and 6.3.24.3) has been undertaken in consultation with the Environment Agency and local authorities which includes consideration of the sequential approach. The OnSS design includes a surface water drainage scheme, based on the SuDS principles, which will manage rainfall runoff from the OnSS location and will not increase flood risk locally or in the wider area.

Legislation/ policy	Key provisions	Section where comment addressed
	Paragraph 5.16.3 requires applicants to undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment where it is considered that a project is likely to have effects on the water environment, and how this might change due to the impact of climate change on rainfall patterns and consequently water availability across the water environment.	The baseline environment (Section 24.4) is described for the hydrology, hydrogeology and flood risk study area. An assessment of the impacts on water quality, resources and physical characteristics is provided in Section 24.7 of sensitivity for environmental receptors takes into consideration RBMPs and WFD status (Section 24.4 and Table 24.21).
	Paragraphs 5.16.12 to 5.16.15 ask the SoS to ensure that proposals have regard for River Basin Management Plans (RBMP) and meets the requirements of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The SoS must also consider duties under other legislation including duties under the Environment Act 2021 in relation to environmental targets and have regard to the policies set out in the Government's Environmental Improvement Plan.	
National Policy Statement for Renewable Energy Infrastructure (NPS EN-3) (2023)	Paragraph 2.6.2 notes that where precise details of proposed developments are not known, the maximum potential adverse effects of the project should be considered.	Where options exist, the maximum height or footprint (referred to as the Maximum Design Scenario (MDS)) has been considered within this assessment as described in Section 24.5.
Revised Draft NPS EN-3	Paragraph 2.8.101 states that applicants must undertake a detailed assessment for all phases of the lifespan of that development.	Environmental assessment has been undertaken for all stages of the lifespan of the Project at Section 24.7 for the construction, operation and decommissioning stages respectively.
National Planning Policy Framework (NPPF) (2023)	Paragraph 167 requires that all plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate	FRA reporting (document ref: 6.3.24.2 and 6.3.24.3) has been undertaken in consultation with the Environment Agency and local authorities which

Legislation/ policy	Key provisions	Section where comment addressed
	change – so as to avoid, where possible, flood risk to people and property. This requirement is supported by NPPF planning practice guidance for flood risk and coastal change which states "other forms of flooding need to be treated consistently with river and tidal flooding in mapping probability and assessing vulnerability, so that the sequential approach can be applied across all areas of flood risk."	includes consideration of the sequential approach.
NPPF	Paragraph 173 of NPPF states that local planning authorities should ensure that flood risk is not increased elsewhere and where appropriate, applications should be supported by a site-specific flood-risk assessment.	FRA reporting (document ref: 6.3.24.2 and 6.3.24.3) has been undertaken in consultation with the Environment Agency and local authorities which includes consideration of the sequential approach.
NPPF	Paragraph 175 requires that major developments incorporate sustainable drainage systems, in line with Local Authority guidance; have appropriate proposed minimum operational standards; have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and where possible, provide multifunctional benefits.	The potential for the proposed onshore infrastructure associated with the Project to cause additional run-off has been assessed within the FRA for the onshore ECC and OnSS (document ref: 6.3.24.2 and 6.3.24.3). The OnSS design includes a surface water drainage scheme, based on the SuDS principles, which will manage rainfall runoff from the OnSS location and will not increase flood risk locally or in the wider area

24.2.4 Local Planning Policy

21. Planning policies of relevance in terms of hydrology, hydrogeology and flood risk are listed below:

- East Lindsey District Council Local Plan Core Strategy (adopted July 2018)
  - Strategic Policy 16 (SP16): Inland Flood Risk
  - Strategic Policy 17 (SP17): Coastal East Lindsey
- South East Lincolnshire Local Plan (adopted March 2019)
  - Policy 4: Approach to Flood Risk

24.2.4.1 Shoreline Management Plans

22. Shoreline Management Plans (SMP) outline strategy for managing flood and erosion risk along the coastline, over short, medium and long-term periods. SMP3 has been prepared by the Humber Estuary Coastal Authorities Group and covers the east coast of England from Flamborough Head to Gibraltar Point. SMP4 has been prepared by the East Anglia Coastal Group and covers the coastline from Gibraltar Point to Old Hunstanton.

24.2.4.2 Other Relevant Guidance

23. Relevant UK guidance on good practice for construction projects that will be referenced during assessment is detailed in the following documents:

- Control of Water Pollution from Construction Sites (C532), Construction Industry Research and Information Association, (CIRIA) 2001;
- Environmental Good Practice on Site (C741), CIRIA 2015;
- Control of water pollution from linear construction projects (C648), CIRIA 2006;
- The Environment Agency's approach to groundwater protection, version 1.2, February 2018; and
- The SuDS Manual (C753), CIRIA 2015.

24. The CIRIA guidance provides help on environmental good practice for the control of water pollution arising from construction activities. It focuses on the potential sources of water pollution from within construction sites and the effective methods of preventing its occurrence.

25. The Environment Agency guidance is part of a wider suite of documents and guidance relating to groundwater protection which sets out principles for assessing risk, protecting groundwater, and permitting of abstractions and discharges from groundwater. The full suite of documents relating to groundwater can be found on the GOV.UK website.

26. The SuDS Manual incorporates the latest research, industry practice, and guidance for design, delivery, and maintenance of Sustainable Drainage Systems (SuDS).

24.3 Consultation

27. Consultation is a key part of the Development Consent Order (DCO) application process. Consultation regarding hydrology, hydrogeology and flood risk has been conducted through the Evidence Plan Process (EPP), Expert Technical Group (ETG) meetings, the EIA scoping process (Outer Dowsing Offshore Wind, 2022), and the Preliminary Environmental Information Report (PEIR) process (Outer Dowsing Offshore Wind, 2023). An overview of the Project's technical consultation process is presented within Volume 1, Chapter 6: Technical Consultation (document reference 6.1.6) and wider consultation is presented in the Consultation Report (document reference 5.1).

28. A summary of the key issues raised during consultation, specific to hydrology, hydrogeology and flood risk, is outlined in Table 24.2 below, together with how these issues have been considered in the production of this ES.

Table 24.2 Summary of consultation relating to hydrology, hydrogeology and flood risk

Date and consultee	Consultation and key comments	Section where comment addressed
Scoping Opinion		
Scoping Opinion (the Planning Inspectorate, 9 September 2022) Comment ID: 3.17.1 Table 8.5.4	Accidental spillages and leakages of polluting substances – Construction, O&M and Decommissioning The Scoping Report proposes to scope out accidental pollution resulting from construction, operation and decommissioning of the Proposed Development. The Planning Inspectorate agrees that such effects are capable of mitigation through standard management practices and can be scoped out of the assessment. The ES should provide details of the proposed mitigation measures to be included in the Environment Management Plan. The ES should also explain how such measures will be secured.	This comment has been addressed in Section 24.5.3. An Outline CoCP (document reference 8.1) outlining these measures has also been provided as part of the DCO application, specifically within the Outline PPEIRP (document reference 8.1.4).
Scoping Opinion (the Planning Inspectorate, 9 September 2022) Comment ID: 3.17.2 Table 8.5.4	Impact on Water Framework Directive (WFD) status for surface water or groundwater bodies – O&M The Planning Inspectorate agrees that once installed, the underground cabling elements of the proposed onshore development are unlikely to have significant effects on WFD waterbodies during the operational phase and this matter can be scoped out of the assessment.	This comment has been addressed in Section 24.5.1.2.
Scoping Opinion (the Planning Inspectorate, 9 September 2022) Comment ID: 3.17.3 Table 8.5.4	Potential for damage to flood defence or surface water drainage infrastructure – Decommissioning The Scoping Report seeks to scope this matter out on the basis that onshore cables would be left in situ and therefore no effects would result from decommissioning. However, the Scoping Report currently contains limited information with regard to decommissioning activities. The ES should consider the potential for damage to flood defences as a result of required decommissioning activities, such as the removal of any above ground infrastructure, and also whether any	This comment has been addressed in Table 24.18.

Date and consultee	Consultation and key comments	Section where comment addressed
	elements left in situ would impact the future maintenance or improvement works to flood defences.	
Scoping Opinion (the Planning Inspectorate, 9 September 2022) Comment ID: 3.17.4 Table 8.5.4	Pollution or disruption of flow to groundwater through ground excavations or piling – Decommissioning. The Scoping Report seeks to scope out this matter on the basis that any piling or deep excavation works would be left in situ and therefore no effects would result from decommissioning. The Scoping Report contains very limited reference to piling or deep excavations, or the likely decommissioning activities. However, the Planning Inspectorate agrees that where the Proposed Development is to be left in situ and there would be no pollution or disruption of flow to ground water arising from decommissioning activities, this matter can be scoped out of the assessment.	This comment has been addressed in Section 24.5.1.2.
Scoping Opinion (the Planning Inspectorate, 9 September 2022) Comment ID: 3.17.5 Table 8.5.4	Changes to surface water drainage at the OnSS location – Cumulative The Scoping Report states that the proposed surface water management scheme will reduce the potential for significant impacts from the Proposed Development in this regard and there would be no potential for cumulative impacts during the operational phase. The Scoping Report contains limited information on the proposed surface water management, or likely projects or plans that may act cumulatively; therefore, the Planning Inspectorate cannot agree that this matter can be scoped out of the assessment at this stage. The ES should include an assessment of cumulative changes to surface water drainage at the OnSS location, where likely significant effects could occur.	This comment has been addressed in Section 24.8.
Scoping Opinion (the Planning Inspectorate, 9 September 2022)	Transboundary hydrology, hydrogeology and flood risk effects Onshore transboundary effects are scoped out of the assessment as the Applicant considers that hydrology, hydrogeology and flood risk transboundary effects will be highly unlikely to occur. The Planning	This comment has been addressed in Section 24.10.

Date and consultee	Consultation and key comments	Section where comment addressed
Comment ID: 3.17.6 Paragraph 8.5.42	Inspectorate agrees that as effects are likely to be localised, this matter can be scoped out of the assessment.	
Scoping Opinion (the Planning Inspectorate, 9 September 2022) Comment ID: 3.17.7 Paragraph 8.5.4	Study area The Scoping Report describes a study area of up to 2km from the AoS as appropriate for areas where there is potential for hydraulic connectivity but does not give reasons for the choice of study area nor the approach that will be used to refine the study area for the ES. The ES should explain the rationale behind the choice of study area and, where possible, the approach should be discussed with the relevant consultation bodies.	This comment has been addressed in Section 24.4.1.
Scoping Opinion (the Planning Inspectorate, 9 September 2022) Comment ID: 3.17.8 Paragraph 8.5.46	WFD assessment The Planning Inspectorate recommends the sources of data and guidance listed in Table 7.2.1 (Marine Water Quality) of the Scoping Report also be considered for the WFD assessment identified for the onshore aspect chapter, where applicable. It is unclear if one WFD assessment is to be provided for the Proposed Development with the ES and DCO application. The Planning Inspectorate recommends that one WFD assessment be provided, with the information used to inform both the Offshore: Marine Water Quality and Onshore: Hydrology, Hydrogeology and Flood Risk aspect assessments.	A WFD Compliance Assessment is included in the WFD Assessment (document reference 6.3.8.1).
Scoping Opinion (the Planning Inspectorate, 9 September 2022) Comment ID: 3.17.9	Future proposals for watercourses within the study area. The Planning Inspectorate points the Applicant to the response from South Holland Internal Drainage Board (IDB) for consideration in the future baseline for hydrology, drainage and flood risk. The ES should identify any future plans that could involve potential widening of watercourses and the implications for the Proposed Development during construction, operation and decommissioning. The Applicant is encouraged to discuss future plans for waterbodies with the relevant consultation bodies, including the IDBs and the EA.	This comment has been addressed in Section 24.7.

Date and consultee	Consultation and key comments	Section where comment addressed
Expert Topic Group (ETG) Meetings		
ETG Meeting (online) 19th July 2022	Outlined general methodology, study area, baseline environment and impacts to be scoped in and out. Environment Agency advised abstraction licenses and private and domestic water supplies should be considered as a potential receptor along the route. IDBs advised all watercourses to be crossed by HDD. No areas of disagreement or objections raised during the meeting or minutes.	n/a
ETG Meeting (online) 12th October 2022	Scoping opinion comments discussed. Methodology, baseline study area and next steps for PEIR discussed. No areas of disagreement or objections raised during the meeting or minutes.	n/a
ETG Meeting (online) 26th January 2023	Outlined proposed scope of assessment, study area, key receptors, methodology and embedded mitigation. Discussion with IDBs about Statement of Common Ground (SoCG) document and project parameters. No areas of disagreement or objections raised during the meeting or minutes.	n/a
ETG Meeting (online) 16th March 2023	Agreement logs, ongoing surveys and preparation of PEIR discussed. Discussion with IDBs about Statement of Common Ground (SoCG) document and project parameters. Natural England advised on inclusion of an Outline Bentonite Management Plan. No areas of disagreement or objections raised during the meeting or minutes.	Principles for bentonite breakout management have been included in an Outline Onshore Pollution Prevention and Emergency Incident Response Plan (document reference 8.1.4) provided as part of the Outline CoCP (document reference 8.1).
ETG Meeting (online) 2nd August 2023	Ongoing preparation for ES set out together with S42 consultee responses and project response. No areas of disagreement or objections raised during the meeting or minutes.	n/a
ETG Meeting (online) 18th September 2023	Ongoing preparation for ES set out together with refined project parameters. Summary of S42 consultee responses and project	n/a

Date and consultee	Consultation and key comments	Section where comment addressed
	response. No areas of disagreement or objections raised during the meeting or minutes.	
ETG Meeting (online) 30th November 2023	Ongoing preparation for ES set out with initial flood modelling results for OnSS, initial Groundwater Risk Assessment results, OnSS drainage and IDB crossing arrangements. No areas of disagreement or objections raised during the meeting or minutes.	n/a
Section 42 Responses		
National Farmers Union 20th July 2023	The pre-condition survey also mentions that it will consider the existing private water supplies. Please provide further information regarding the potential interruption to private water supplies from construction, and detail of how Outer Dowsing proposes to mitigate this in order to minimise disruption to agricultural activities.	This comment has been addressed in Section 24.7.
Natural England 20th July 2023	Comment – Sea Bank Clay Pits Site of Special Scientific Interest (SSSI) – Natural England note that, where the project makes landfall, it will cross under the Sea Bank Clay Pits SSSI via HDD. This SSSI is predominantly designated for hydrological features which can be susceptible to changes in the water table caused by trenchless crossing. The main risk to this site from the proposed development is considered to be the impacts or changes to the hydrology, specifically quantity and quality of the water that currently feeds the site. This includes changes to ditches and waterbodies in the immediate vicinity. Recommendation – We advise that the project should provide further site-specific survey data on the hydrographic conditions which maintain the designated features within the site. Further to this, we advise that the Project will need to use the results of this survey to provide a detailed method statement to show that it has reduced the risk of this work impacting on the notified features of this site. Natural	Following further design refinement, the landfall HDD does not cross underneath Sea Bank Clay Pits SSSI. However, acknowledging the sensitivity of the receptor, a Groundwater Risk Assessment (document reference: 6.3.24.1) has been included within the DCO application.

Date and consultee	Consultation and key comments	Section where comment addressed
	England advises that the project also provides a site-specific management plan to demonstrate the measures which will be taken to further reduce the risk of impacts to the site which cannot be ruled out through the design phase.	
Environment Agency 20th July 2023	Project Onshore Substation: Should any Project Onshore Substation be required at Weston Marsh then this will need to be included within the flood risk assessment as it is likely to be at risk of flooding.	An FRA for the OnSS has been included in document reference 6.3.24.3.
Environment Agency 20th July 2023	Table 2.2 and para. 4.4.5 states that document 8.8 is a Baseline Flood Risk Assessment (FRA). This document does not appear to have been included in this PEIR consultation.	FRAs for the OnSS and onshore ECC have been included as document reference 6.3.24.2 and 6.3.24.3.
Environment Agency 20th July 2023	We welcome the confirmation that a pre-construction drainage plan will be developed and that appropriate permits will be obtained for water discharges.	The principles of managing drainage during construction are included in the Outline Surface Water Drainage Strategy (document reference: 8.1.5) provided as part of the Outline CoCP (document reference 8.1). These will be developed into a final plan in the pre-construction stage.
Environment Agency 20th July 2023	We welcome the inclusion of decommissioning considerations in terms of flood risk within the PEIR, as we requested in our response to the scoping opinion. The PEIR also confirms that a Flood Risk Assessment (FRA) will be undertaken. We look forwards to working with you further on scoping the FRA for all phases of construction, operation, and decommissioning.	The impacts of decommissioning have been considered in Section 24.7. FRAs for the OnSS and onshore ECC has been included in document reference 6.3.24.2 and 6.3.24.3.
Environment Agency 20th July 2023	Onshore ECC and OnSS: We support that the Maximum Design Scenario (MDS) will be based on the worst-case scenario (maximum number of cables and assumes disturbance throughout the onshore ECC area and maximum development footprint (temporary and permanent). The impact of construction on the floodplain and within	This comment has been addressed in the OnSS and onshore ECC and 400kV cables FRAs (document reference 6.3.24.2 and 6.3.24.3).

Date and consultee	Consultation and key comments	Section where comment addressed
	flood flow routes (e.g. temporary compounds, excavation and materials within the floodplain) must be considered and if required, mitigated.	
Environment Agency 20th July 2023	Trenchless drilling works: It is not clear from the statement in this section that all Main River Crossings must be trenchless. All main river crossings must be trenchless as we have previously advised.	This comment has been addressed in Table 24.19.
Environment Agency 20th July 2023	Construction Method Statement: We welcome further discussion on the detailed design and approach to the Main River and defence crossings, including any relevant permits/agreements required for any ground investigations. The PEIR advises that document No: 8.1.8: Outline Preliminary Crossing Schedule Onshore will form part of the Code of Construction Practice to be submitted as part of the DCO Application. This section of the table refers to watercourse crossings, but it should also include flood defence crossings. We would welcome further discussions on the detailed design and approach to the Main River and defence crossings.	An updated Onshore Crossing Schedule has been included as document reference 6.3.3.3, which includes the crossing of flood defences as well as watercourse crossings.
Boston Borough Council 24th November 2023	The cable route redline now excludes the Doves Lane Local Wildlife site near Butterwick and so it should not be impacted by the installation of the cables. The Hobhole Drain and Havenside LWS are crossed and this will be by direct drilling so should protect the habitat. The cable route crosses the Haven near to the RSPB reserve at Frampton. They are preparing a Landscape Recovery Bid (LRB) that includes land where the cable will run. RSPB have advised me the developers are aware of this project. Clearly if both projects proceed Outer Dowsing may be able to assist in the LRB as they reinstate the cable route, although that maybe outside the LDO requirements. The route also passes near to the 'South Bank Fosdyke' LWS that lies against the River Welland. The cable route is on the opposite bank	Noted

Date and consultee	Consultation and key comments	Section where comment addressed
	and so will not affect the LWS. However, what is assumed to be a haul road route, runs directly against the LWS and so protection measures need to be clearly stated. This haul route runs towards the National Grid Onshore Substation (NGSS) site that will be considered in a separate application.	
Environment Agency 21st November 2023	We note that for the coastal and River Witham catchment areas, the refined route is almost identical to the original PEIR route, particularly with regard to the Main River and defence crossings. The location of construction infrastructure at the landfall location and along the onshore Export Cable Corridor has been refined but is primarily confined within PEIR route limits. Access to the beach is no longer shown. The PEIR route limits included the Anderby pullover (for access to the beach). We welcome the removal of this route as the use of the Anderby pullover was unacceptable as it would involve the trafficking of plant and machinery over the Anderby Creek Tunnel. However, the Refined Cable Corridor red line boundary shows no access route to the beach at the landfall location. We would be grateful if you could confirm whether access to the beach is required. The Refined Cable Corridor red line boundary shows an additional area adjacent to and within 8m of the Willoughby High Drain at grid reference TF 53196 71686. This is on land outside of the previous PEIR boundary. We request further information is provided on what is proposed for this location, to ensure that our ability to access our assets and maintenance is not restricted.	No planned access to the beach is required for the installation of the land fall cables by HDD. The plans to be submitted to the EA for approval prior to construction will include contingency arrangements for access in the event of an emergency. The additional area within the Order Limits is only a temporary access route for enabling works and will not restrict access to the Willoughby High Drain.
Environment Agency 21st November 2023	The Environmental Update Report concludes that there is potential that the landfall Transition Joint Bays (TJBs) will require raising above	The Project can now confirm that the land at the TJB will not be permanently raised, and

Date and consultee	Consultation and key comments	Section where comment addressed
	ground level following installation. While the Environmental Update Report confirms the extent to which this is required is unknown, the flood risk assessment must assess the impact and detail any mitigation measures required to manage the potential effects of these in respect of flood risk.	any flood risk associated with its installation will be mitigated through the use of a temporary bund which will be removed once the construction is complete.
	The compound locations on the left and right banks of the Wainfleet Relief channel are adjacent to and within 8m of the raised defences. The PEIR Draft Works Plans (Onshore) showed a temporary working compound on the left bank, which was set back significantly and away from the defences. Any compounds should be set back a least 8m from the toe of the raised defences to ensure that they are not impacted and that Environment Agency access to the defences is not restricted.	Noted – all compounds shown on plans are indicative at this stage. All final designs will be developed to make sure this offset is adhered to.
	Within our Welland and Nene Catchment, drawing no. 20231017_22000087_PLN_PEIR_10936.22 upstream of Fossdyke Bridge shows a refined cable route. The original route showed that the cable would be in the vicinity of the River Welland flood defence. However, the updated route shows an option for the cable to be located within the flood defence, which would affect approximately 1km of the defence. Before we can confirm that we accept this route, further details are required to determine if this option is suitable. We need to know the method of cable installation and depths, as well as the proposed mitigation measures. We assume that this would have to make use of open-cut methods as it is not simply crossing the defence whereby directional drilling could be used. We are currently waiting for your model to be submitted for review. We are unable to comment on the setting of the finished floor levels until the model has been approved.	It is not intended to locate the cables within the flood defence. At its closest point, the cables would be a minimum of 40m from the flood defence upstream of Fossdyke Bridge. It is possible that this is a miss understanding of the plans, which show a temporary access track running along the flood defence.

Date and consultee	Consultation and key comments	Section where comment addressed
South Holland Internal Drainage Board 24th November 2023	Two of the Board's arterial watercourses, known as R20 Crowtree Connection (DRN208P2001) and R11 New Drain (DRN208P1101), lie within the Connection Area proposed at Weston Marsh. Additionally, a high-priority watercourse, owned and maintained by the Board, known as R07 Lords (DRN208P0701), is located approximately 150 metres to the east of the site. These watercourses are shown in figure 1 below. The Board request that further information is provided regarding the works proposed within the Connection Area. Please be aware that the Board intends to widen most arterial watercourses over the next 50 years. This could impact your proposals when using both overhead and underground cables.	A description of the works to be undertaken in the Connection Area is presented in Volume 1, Chapter 3: Project Description (Document Reference 6.1.3). Noted Noted
South Holland Internal Drainage Board 24th November 2023	Please be aware of the following Board's Byelaws: Section 23, Land Drainage Act 1991 and Byelaw 4 Works proposed to alter a watercourse (whether on a temporary or permanent basis), requires consent under Section 23 of the Land Drainage Act 1991 (and byelaw 4) including any open cut crossings, culverting or infilling of a watercourse required Section 23 consent. Byelaw 10 Consent is required for all works within 9 metres of the edge of drainage and flood risk management infrastructure. Within the IDB this infrastructure is principally arterial watercourses and water management assets such as pumping stations. The 9 metre distance is measured from the edge/brink of the watercourse (whether open or piped). The 9m zone covers a 360° area around the watercourse, including above and below it, so any crossings of Board maintained watercourses would usually likely require the Boards consent under this Byelaw.	Under the draft DCO, the Land Drainage Act and Byelaws would be disapplied and replaced by the requirements of the protective provisions, making the IDB the approver of the pre-construction details. The technical content of the byelaws is reflected in the arrangements proposed by ODOW and will be confirmed in the pre-construction details to be submitted for approval.

Date and consultee	Consultation and key comments	Section where comment addressed
	Any temporary hall roads within 9 metres of an arterial watercourse will require consent. Byelaw 3 (surface water and treated foul water) All new surface water (or treated foul) discharges into a watercourse within the IDB will require consent from the Board under Byelaw 3. The Board recommend that any discharge is in line with the Non-Statutory technical standards for sustainable drainage systems (SuDS), therefore the Board is unlikely to grant consent for discharges in excess of greenfield rate, however we assess each proposal on a case-by-case basis.	

24.4 Baseline Environment

24.4.1 Study Area

29. The hydrology, hydrogeology and flood risk study area is shown in Volume 2, Figure 24.1 (document reference 6.2.24.1). The study area comprises the onshore elements of the Project (as described in Chapter 3 (document reference 6.1.3)) from MHWS to the onshore Grid Connection Point, plus a 2km buffer around the OnSS and onshore ECC (including landfall, access routes and temporary construction compound (TCC) areas).
30. A 2km offset buffer distance is considered appropriate for data collection and assessment taking into account the nature of the development and likely zone of influence on hydrological receptors, including upstream and downstream catchments that are in hydrological continuity with the onshore elements of the Project. The study area and available data have been discussed and agreed with stakeholders and includes receptors downstream of the onshore elements of the Project which are considered to be in hydraulic continuity within the study area.

24.4.2 Data Sources

31. Baseline data to inform scoping for hydrology, hydrogeology and flood risk has been taken from publicly available information and opensource data from a range of sources. The key sources of publicly available information are:
    - Environment Agency and data.gov.uk:
        - Flood Zone mapping;
        - Spatial Flood Defence data and mapping;
        - Flood Warning and Flood Alert Areas;
        - Main Rivers;
        - Ordinary Watercourses;
        - Groundwater Source Protection Zones (SPZ); and
        - Water Framework Directive (WFD) surface water and groundwater classification data.
    - British Geological Survey (BGS) Mapping:
        - Geology (artificial ground, superficial deposits, bedrock);
        - Borehole/ well data;
        - Aquifer designation; and
        - Groundwater Vulnerability.
    - Defra's MAGIC website/Natural England:
        - Statutory and non-statutory environmental designations.

- Cranfield Soil and Agrifood Institute Soilscapes map viewer:
    - Soil type and character.
- Lincolnshire County Council, East Lindsey District Council, Boston Borough Council and South Holland District Council:
    - Local Flood Risk Management Strategy;
    - Shoreline Management Plan– SMP3 and SMP4; and
    - Strategic Flood Risk Assessment.

32. Targeted data requests and consultation with a number of stakeholders and regulatory bodies have been submitted. The information requested includes:

- Environment Agency:
    - Flood modelling and mapping, flood defence asset information and flood event history;
    - Catchment data for the management catchments of Witham and Welland relating to water quality and WFD classification;
    - Catchment data for the Anglian groundwater catchments relating to water quality and WFD classification;
    - Coastal management data; and
    - Licensed abstractions or water users including data supporting groundwater Source Protection Zone (SPZ) designations.
- Lincolnshire County Council, East Lindsey District Council, Boston Borough Council and South Holland District Council:
    - Registered private water supplies;
    - Shoreline monitoring data;
    - Sustainable drainage guidance to meet LLFA requirements; and
    - Local flood event history.
- Internal Drainage Boards (IDB):
    - Details of all assets managed by respective IDBs (drainage channels, sluices, pumping stations);
    - Details of any capital projects, proposals or plans that are in proximity to or which would have an effect on the cable corridor;
    - Operational practices; and
    - Flood modelling and mapping and flood event history.

24.4.3 Existing Environment

33. This section describes the present conditions which constitute the existing baseline environment for hydrology, hydrogeology and flood risk within the onshore study area.
34. The onshore ECC will make landfall at Wolla Bank and head south to the OnSS at Surfleet Marsh, a 400kV cable corridor will then connect the OnSS to the Project's Connection Area[1]. A description of the proposed works relevant to the ECC is detailed in Chapter 3 (document reference 6.1.3).
35. The onshore study area for hydrology, hydrogeology and flood risk is defined by a 2km buffer around the Order Limits.
36. Due to the linear footprint of the Project, the study area is relatively large-scale, therefore to assist with the interpretation and explanation of associated data, the Order Limits have been split into segments. The extent of these segments has been aligned with key geographical features such as roads or rivers which cross the Order Limits.
37. The study area segments from landfall to Surfleet Marsh are shown in Volume 2, Figure 24.1 (document reference 6.2.24.1) and listed below:
    - ECC 1: Landfall to A52 – Hogsthorpe;
    - ECC 2: A52 – Hogsthorpe to Marsh Lane;
    - ECC 3: Marsh Lane to A158 – Skegness Road;
    - ECC 4: A158 – Skegness Road to Low Road;
    - ECC 5: Low Road to Steeping River;
    - ECC 6: Steeping River to Fodder Dike Bank/Fen Bank;
    - ECC 7: Fodder Dike Bank/Fen Bank to Broadgate;
    - ECC 8: Broadgate to Ings Drove;
    - ECC 9: Ings Drove to Church End Lane;
    - ECC 10: Church End Lane to The Haven;
    - ECC 11: The Haven to Marsh Road;
    - ECC 12: Marsh Road to Fosdyke Bridge;
    - ECC 13: Fosdyke Bridge to Surfleet Marsh OnSS/Marsh Drove; and
    - ECC 14: Surfleet Marsh OnSS/Marsh Drove to Connection Area.
38. The Surface Water Operational Catchments within the study area are shown in Volume 2, Figure 24.2 (document reference 6.2.24.2) and Internal Drainage Board Administrative Boundaries are shown in Volume 2 Figure 24.3 (document reference 6.2.24.3).

24.4.3.1 ECC 1: Landfall to A52 – Hogsthorpe

Hydrological Setting

39. The landfall site is located at Wolla Bank Beach, on the coastline between Anderby Creek and Chapel St Leonards. The North Sea extends eastwards from the coast. At landfall the beach forms part of the sea defences, and forms part of the Environment Agency Saltfleet to Gibraltar Point Strategy, which currently involves annual nourishment of the beach.
40. The Landfall to A52 – Hogsthorpe segment lies within the wider Steeping and Eaus Operational Catchment. On a smaller scale, the majority of the segment is drained by Willoughby High Drain (Main River) which has an entire catchment area of 65.2 km^2. The landfall area is drained by Anderby Main Drain (ordinary watercourse), which has an entire catchment area of 35.3 km^2.
41. Other ordinary watercourses in this segment include Wigg Drain and Four Hundred Acre Drain which drain into the Willoughby High Drain.
42. The drainage board within this segment is Lindsey Marsh Drainage Board (LMDB). There are several LMDB maintained watercourses within this segment, including Wigg Drain. Anderby pumping station is located approximately 600m to the north of the onshore ECC in this segment.
43. The significant watercourses within this segment are shown in Figure 24.4.1.

Watercourse Sensitivity

44. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

45. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).
46. Groundwater beneath the segment is present within the Principal bedrock aquifers of the Burnham Chalk Formation and Welton Chalk Formation. Inland superficial deposits underlying the segment comprise mainly of Tidal Flat Deposits and Till. The majority of these deposits in the segment are classified as an Unproductive aquifer, with some small areas of Secondary (Undifferentiated) aquifer.
47. The majority of the segment lies within an area designated as a Zone 3 of groundwater Source Protection Zone (SPZ). The landfall site and a small area of the segment to the east does not lie within a SPZ.
48. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.1.

Groundwater Sensitivity

49. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

50. Fluvial and tidal flood risk mapping shows the majority of the segment lies within Flood Zone 3. Some small, isolated areas of slightly higher ground along the segment lie within Flood Zone 2.

51. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).
52. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.
53. The flood zones for this segment are shown within Volume 2, Figure 25.4.1.
54. Surface water flood risk mapping produced by the Environment Agency indicates areas in the segment at potential risk of inundation from extreme rainfall. These areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.
55. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the topographic slope into open drainage ditches/ streams or the main watercourse network.
56. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

57. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

58. Under the WFD, monitored watercourses and water bodies within river basins are grouped into management catchments which are made up of smaller waterbody catchments. Each water body is classified based on assessment of monitored data for ecological (possible categories of ‘high’; ‘good’; ‘moderate’; ‘poor’; or ‘bad’) and chemical criteria (possible categories of ‘good’; or ‘fail’).
59. The water body catchments in this segment are:
    - Anderby Main Drain
        - ecological status: moderate: and
        - chemical status: fail.
    - Willoughby High Drain
        - ecological status: moderate: and
        - chemical status: fail.

Coastal / Transitional Water Quality

60. The coastal waters are monitored as part of the Lincolnshire Coastal Waterbody which has moderate ecological status and failing chemical status.

Bathing Water Quality

61. The Environment Agency is responsible for monitoring bathing waters in England. Monitoring locations in close proximity to the study area include:
    - Moggs Eye (north of Anderby Creek):
    - Anderby (at Anderby Creek): and
    - Chapel St Leonards (south of Anderby Creek).
62. The classification of the identified Bathing Waters, for each year, reported between 2017 and 2022 (no classification for 2020 due to lack of data sampling), are Excellent.

Groundwater Quality

63. Under the Anglian RBMP the monitored groundwater bodies within the river basin area have been grouped into management catchments. Each groundwater body is classified based on assessment of monitored data for quantitative criteria (possible categories of 'good' or 'poor') and chemical criteria (possible categories of 'good'; or 'poor'), with an overall status classification based on these assessments.
64. There is a single groundwater catchment assessed as part of the RBMP which is within this segment of the ECC. This is the Steeping Long Eau Little Eau Chalk Unit water body associated with bedrock geology beneath the study area. The water body has poor overall status with good quantitative status and poor chemical status.

Pollution Events

65. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

66. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.1 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

67. There are no permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.
68. Table 24.3 shows registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.3 Registered private water supplies for segment ECC 1

Registered User	Location	Source	Use	Distance from Order Limits (m)
Patmans Cottage (Mumby)	TF 51852 75014	Unknown	Domestic	1945 NW
Field House Farm (Mumby)	TF 51998 74305	Borehole	Domestic	1415 NW
33 St Leonards Drive (Chapel St Leonards)	TF 55471 72603	Borehole	Domestic	1841 SE

69. Volume 2, Figure 24.5.1 shows the location of private water supplies which are recorded within the study area for this segment.

Designated Sites

70. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).
71. There are several ecological designations located within the study area for this segment. These consist of the following statutory designations:
    - Greater Wash – Special Protection Area (SPA);
    - Sea Bank Clay Pits –SSSI;
    - Chapel Point to Wolla Bank – SSSI;
    - Anderby Marsh – Local Wildlife Site;
    - Wolla Bank Reedbed – Local Wildlife Site;
    - Wolla Bank Pit – Local Wildlife Site;
    - Anderby Creek Sand Dunes – Local Wildlife Site;
    - Wolla Bank South – Local Wildlife Site;
    - Chapel Six Marshes – Local Wildlife Site;
    - Chapel Point Dunes North – Local Wildlife Site; and
    - Chapel Point Dunes South – Local Wildlife Site;

24.4.3.2 ECC 2: A52 – Hogsthorpe to Marsh Lane

Hydrological Setting

72. A52 – Hogsthorpe to Marsh Lane segment lies within the wider Steeping and Eaus Operational Catchment. On a smaller scale, the northern part of this segment is drained by Willoughby High Drain (Main River), which has an entire catchment area of 65.2 km^2. The southern part of this segment is largely served by the Orby Drain catchment.
73. Other watercourses within this segment include Four Hundred Acre Drain, Hildyke Drain, Orby Drain and Wyche Drain.

74. The drainage board within this segment is LMDB. There are several LMDB maintained watercourses within this segment including Wyche Drain, Orby North Drain and Orby South drain.

75. The significant watercourses within this segment are shown Volume 2, Figure 24.4.2.

Watercourse Sensitivity

76. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Geological and Hydrogeological Setting

77. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

78. Groundwater beneath the segment is present within the Principal bedrock aquifers of the Burnham Chalk Formation and Welton Chalk Formation. Inland superficial deposits underlying the segment comprises mainly of Tidal Flat Deposits with some isolated areas of Till. These deposits are classified as Unproductive aquifers, with a small area of Secondary (Undifferentiated aquifer).

79. The segment lies within an area designated as Zone 3 of a groundwater Source Protection Zone.

80. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.2.

Groundwater Sensitivity

81. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

82. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

83. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).

84. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.

85. The flood zones for this segment are shown within Volume 2, Figure 25.4.2.

86. Surface water flood risk mapping produced by the Environment Agency indicates areas in the segment at potential risk of inundation from extreme rainfall. The majority of these areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

87. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradient into open drainage ditches/ streams or the main watercourse network.
88. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

89. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

90. The water body catchment in this segment is:
    - Willoughby High Drain
        - ecological status: moderate; and
        - chemical status: fail

Groundwater Quality

91. There is a single groundwater catchment assessed as part of the RBMP which is within this segment of the ECC. This is the Steeping Long Eau Little Eau Chalk Unit water body associated with bedrock geology beneath the study area. The water body has poor overall status with good quantitative status and poor chemical status.

Pollution Events

92. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

93. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.2 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

94. Table 24.4 shows permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.4 Permitted abstractions for segment ECC 2

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
4/29/16/*S/0067	Hillview Leisure Ltd	TF 5381 7146	Surface Water	Amenity	297 E
4/29/16/*S/0068	I M Smalley	TF 5354 7157	Surface Water	Agriculture	173 E

95. Volume 2, Figure 24.5.2 shows the location of abstractions which are recorded within the study area for this segment.

96. There are no registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Designated Sites

97. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

98. Sloothby Low Lane Local Wildlife Site is the only ecological designation located within the study area for this segment.

24.4.3.3 ECC 3: Marsh Lane to A158 – Skegness Road

Hydrological Setting

99. The Marsh Lane to A158 – Skegness Road segment lies within the wider Steeping and Eaus Operational Catchment. On a smaller scale, the segment is drained by Ingoldmells Main Drain (ordinary watercourse), which has an entire catchment area of 29.3 km^2.

100. The drainage board within this segment is LMDB. There are several LMDB maintained watercourses within this segment including Orby South Drain, Ingoldmells Main Drain, Black House Farm Drain, Mill Hill Drain and Burgh Marsh Drain. Burgh le Marsh pumping station is located approximately 1.3km southwest of the onshore ECC at this segment.

101. The significant watercourses within this segment are shown in Volume 2, Figure 24.4.3.

Watercourse Sensitivity

102. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

103. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

104. Groundwater beneath the segment is present within the Principal bedrock aquifers of the Claxby Ironstone Formation, Tealby Formation and Roach Formation. Inland superficial deposits underlying the segment comprises of Tidal Flat Deposits. These deposits are classified as Unproductive aquifers.

105. The segment lies within an area designated as Zone 3 of groundwater SPZ.

106. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.3.

Groundwater Sensitivity

107. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

108. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

109. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200 year event (0.5% Annual Exceedance Probability (AEP)).

110. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.

111. The flood zones for this segment are shown within Volume 2, Figure 25.4.3.

112. Surface water flood risk mapping produced by the Environment Agency indicates areas in the segment at risk at potential risk of inundation from extreme rainfall. The majority of these areas are limited to very small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

113. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradients into open drainage ditches/ streams or the main watercourse network.

114. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

115. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

116. The water body catchment in this segment is:

- Ingoldmells Main Drain:
  - ecological status: moderate; and
  - chemical status: fail.

Groundwater Quality

117. There is a single groundwater catchment assessed as part of the RBMP which is within this segment of the ECC. This is the Steeping Long Eau Little Eau Chalk Unit water body associated with bedrock geology beneath the study area. The water body has poor overall status with good quantitative status and poor chemical status.

Pollution Events

118. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within segment this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

119. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.3 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

120. There are no permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

121. Table 24.5 shows registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.5 Registered private water supplies for segment ECC 3

Registered User	Location	Source	Use	Distance from Order Limits (m)
White House Farm (Addlethorpe)	TF 53817 67713	Borehole	Domestic	852 E
Bristol Farm (Burgh Le Marsh)	TF 53040 66237	Unknown	Domestic	217 E

122. Volume 2, Figure 24.5.3 shows the location of private water supplies which are recorded within the study area for this segment.

Designated Sites

123. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

124. There are no ecological designations located within the study area for this segment.

24.4.3.4 ECC 4: A158 – Skegness Road to Low Road

Hydrological Setting

125. The A158 – Skegness Road to Low Road segment lies within the wider Steeping and Eaus Operational Catchment. On a smaller scale, the segment is drained by three watercourses:

- Wedlands and North Drains (ordinary watercourse), which has an entire catchment area of 15.2 km^2;
- Lymn/Steeping (Main River), which has an entire catchment area of 170.3 km^2; and
- Cow Bank Drain (ordinary watercourse), which has an entire catchment area of 13.8 km^2.

126. Other watercourses in this segment include Catchwater Drain.

127. The drainage board within this segment is Lindsey Marsh IDB (LMDB). There are several LMDB maintained watercourses and pumping stations within or serving this segment, including College Drain, Catchwater Drain, Rookery Drain, Croft Drain, Pinchbeck Drain, Caudwells Drain and Searbys Glasshouse Drain. The pumping stations include:

- Burgh le Marsh pumping station located approximately 1.3km northwest of the onshore ECC;
- Gotts pumping station located approximately 1.3km east of the onshore ECC; and
- Crown Farm pumping station located approximately 1.8km southwest of the onshore ECC.

128. The significant watercourses within this segment are shown in Volume 2, Figure 24.4.4.

Watercourse Sensitivity

129. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

130. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

131. Groundwater beneath the segment is present within the Secondary B bedrock aquifers of the Claxby Ironstone Formation, Tealby Formation and Roach Formation. Inland superficial deposits underlying the segment comprises of Tidal Flat Deposits. These deposits are classified as Unproductive aquifers.

132. The majority of the segment is not designated as a SPZ. A small area to the north of the segment lies within an area designated as Zone 3 of groundwater SPZ.

133. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.1.

Groundwater Sensitivity

134. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

135. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

136. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).

137. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.

138. The flood zones for this segment are shown within Volume 2, Figure 25.4.4.

139. Surface water flood risk mapping produced by the Environment Agency indicates areas in the segment at risk at potential risk of inundation from extreme rainfall. The majority of these areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

140. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradients into open drainage ditches/ streams or the main watercourse network.

141. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

142. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

143. The water body catchments in this segment are:

- Wedlands and North Drains:
  - ecological status: moderate; and
  - chemical status: fail.
- Lymn/Steeping:
  - ecological status: moderate; and
  - chemical status: fail.
- Cow Bank Drain:
  - ecological status: moderate; and
  - chemical status: fail.

Groundwater Quality

144. Under the Anglian RBMP the monitored groundwater bodies within the river basin area have been grouped into management catchments. Each groundwater body is classified based on assessment of monitored data for quantitative criteria (possible categories of 'good' or 'poor') and chemical criteria (possible categories of 'good'; or 'poor'), with an overall status classification based on these assessments.

145. There is a single groundwater catchment assessed as part of the RBMP which is within this segment of the ECC. This is the South Lincolnshire Chalk Unit water body associated with bedrock geology beneath the study area. The water body has poor overall status with good quantitative status and poor chemical status.

Pollution Events

146. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within segment this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

147. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.4 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

148. Table 24.6 shows permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.6 Permitted abstractions for segment ECC 4

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
AN/030/0014/011	J L Dodsworth and Co	TF 54004 62809	Surface Water	Environmental	1883 E
4/30/14/*S/0132	Croftmarsh Ltd	TF 5400 6245	Surface Water	Agriculture	1834 E

149. Figure 24.5.4 shows the location of abstractions which are recorded within the study area for this segment.

150. There are no registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Designated Sites

151. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

152. There is one ecological designation located within 2km of the segment. This consists of the following statutory designation:

- Middlemarsh Farm – Local Wildlife Site

24.4.3.5 ECC 5: Low Road to Steeping River

Hydrological Setting

153. The Low Road to Steeping River segment lies within the wider Steeping and Eaus Operational Catchment. On a smaller scale, the segment is drained by the Lymn/Steeping (Main River), which has an entire catchment area of 170.3 km^2.

154. Other watercourses in this segment include the Wainfleet Relief Channel.

155. The drainage board within this segment is Lindsey Marsh IDB (LMDB). There are several LMDB maintained watercourses and pumping stations within or serving this segment, including College Drain, Catchwater Drain, Rookery Drain, Croft Drain, Pinchbeck Drain, Caudwells Drain and Searbys Glasshouse Drain. The pumping stations include:

- Crown Farm pumping station located approximately 1.4km east of the onshore ECC; and
- Thorpe Culvert pumping station located approximately 1.8km northwest of the onshore ECC.

156. The significant watercourses within this segment are shown in Volume 2, Figure 24.4.5.

Watercourse Sensitivity

157. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

158. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

159. Groundwater beneath the segment is present within the Secondary B bedrock aquifers of the Claxby Ironstone Formation, Tealby Formation and Roach Formation and the Principal aquifer of the Spilsby Sandstone Formation. Inland superficial deposits underlying the segment comprises of Tidal Flat Deposits. These deposits are classified as Unproductive aquifers.

160. The majority of the segment is not designated as a SPZ. An area to the south of the segment, associated with the Principal Aquifer, is designated as Zone 3 of groundwater SPZ.

161. The aquifer designations and SPZs for this segment are shown within Figure 24.5.5.

Groundwater Sensitivity

162. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

163. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

164. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).

165. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.

166. The flood zones for this segment are shown within Volume 2, Figure 25.4.5.

167. Surface water flood risk mapping produced by the Environment Agency indicates areas in the segment at risk at potential risk of inundation from extreme rainfall. The majority of these areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

168. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradients into open drainage ditches/ streams or the main watercourse network.

169. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

170. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

171. The water body catchments in this segment is:

- Lymn/Steeping:
  - ecological status: moderate; and
  - chemical status: fail.

Groundwater Quality

172. Under the Anglian RBMP the monitored groundwater bodies within the river basin area have been grouped into management catchments. Each groundwater body is classified based on assessment of monitored data for quantitative criteria (possible categories of ‘good’ or ‘poor’) and chemical criteria (possible categories of ‘good’; or ‘poor’), with an overall status classification based on these assessments.

173. There are two groundwater catchments assessed as part of the RBMP which is within this segment of the ECC. These are:

- South Lincolnshire Chalk Unit water body – associated with bedrock geology beneath the study area. The water body has poor overall status with good quantitative status and poor chemical status.
- Spilsby Sandstone Unit water body – associated with bedrock geology beneath the study area. The water body has poor overall status with a poor quantitative status and poor chemical status.

Pollution Events

174. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within segment this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

175. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.5shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

176. Table 24.7 shows permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.7 Permitted abstractions for segment ECC 5

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
4/30/14/*S/0070	M J Worth Ltd	TF 53143 59849	Surface Water	Agriculture	1704 SE
4/30/14/*S/0006	Lindsey Marsh Drainage Board	TF 5245 5995	Surface Water	Industrial, Commercial and Public Services	1208 SE
AN/030/0014/003/R01	J & JF Edwards & Sons	TF 52018 59602	Surface Water	Agriculture	1427 SE
4/30/14/*S/0131	Croftmarsh Ltd	TF 50837 59888	Surface Water	Agriculture	1215 SE
AN/030/0014/014	Staples (Vegetables) Limited	TF 50022 58638	Surface Water	Agriculture	1493 SE
4/30/14/*S/0060	C W Parker (Wainfleet) Ltd	TF 50195 61988	Surface Water	Agriculture	1111 N

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
4/30/14/*S/0006	Lindsey Marsh Drainage Board	TF 5020 6135	Surface Water	Industrial, Commercial and Public Services	517 N
4/30/14/*S/0006	Lindsey Marsh Drainage Board	TF 4924 6162	Surface Water	Industrial, Commercial and Public Services	1134 N

177. Volume 2, Figure 24.5.5 shows the location of abstractions which are recorded within the study area for this segment.

178. There are no registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Designated Sites

179. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

180. There are no ecological designations located within the study area for this segment.

24.4.3.6 ECC 6: Steeping River to Fodder Dike Bank/Fen Bank

Hydrological Setting

181. The Steeping River to Fodder Dike Bank/Fen Bank segment lies within the wider Fens East and West Operational Catchment. There are no Main Rivers within this segment.

182. The drainage board within this segment is Witham Fourth Internal Drainage Board (W4IDB). There are several W4IDB maintained watercourses within this segment, including Quakers, Chambers and Branch, Dodds and Pile Bank to Low Road and Decoy and Extension. There are no pumping stations within this segment.

183. The significant watercourses within this segment are shown in Volume 2, Figure 24.4.6.

Watercourse Sensitivity

184. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

185. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

186. Groundwater beneath the segment is present within the Principal aquifers of the Spilsby Sandstone Formation. Inland superficial deposits underlying the segment comprises of Tidal Flat Deposits. These deposits are classified as Unproductive aquifers.

187. The southern part of the segment is not designated as a SPZ. To the north of the segment, the area is designated as Zone 3 of groundwater SPZ associated with the Principal aquifer.

188. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.6.

Groundwater Sensitivity

189. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

190. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

191. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).

192. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.

193. The flood zones for this segment are shown within Volume 2, Figure 25.4.6.

194. Surface water flood risk mapping produced by the Environment Agency indicates there are limited areas in the segment at potential risk of inundation from extreme rainfall. These areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

195. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradients into open drainage ditches/ streams or the main watercourse network.

196. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

197. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

198. There are no monitored water body catchments within this segment.

Groundwater Quality

199. Under the Anglian RBMP the monitored groundwater bodies within the river basin area have been grouped into management catchments. Each groundwater body is classified based on assessment of monitored data for quantitative criteria (possible categories of 'good' or 'poor') and chemical criteria (possible categories of 'good'; or 'poor'), with an overall status classification based on these assessments.

200. There is a groundwater catchment assessed as part of the RBMP which is within the northern part of this segment of the ECC. This is the Spilsby Sandstone Unit water body which has poor overall status with poor quantitative status and good chemical status.

Pollution Events

201. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within segment this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

202. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.6 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

203. Table 24.8 shows permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.8 Permitted abstractions for segment ECC 6

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
AN/030/0013/080	M J Worth Ltd	TF 50078 56369	Surface Water	Agriculture	1969 SE
AN/030/0013/080	M J Worth Ltd	TF 49020 56620	Surface Water	Agriculture	983 SE
AN/030/0013/002	Staples Bros Ltd	TF 4874 5626	Surface Water	Agriculture	1162 SE
AN/030/0013/002	Staples Bros Ltd	TF 4857 5618	Surface Water	Agriculture	1200 SE
AN/030/0013/053	A E Lenton Limited	TF 47282 57776	Surface Water	Agriculture	43 E
AN/030/0013/053	A E Lenton Limited	TF 47040 57740	Surface Water	Agriculture	118 W
AN/030/0013/053	A E Lenton Limited	TF 47465 58429	Surface Water	Agriculture	62 N

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
AN/030/0013/053	A E Lenton Limited	TF 46940 59657	Surface Water	Agriculture	1374 NW
AN/030/0013/053	A E Lenton Limited	TF 47290 59704	Surface Water	Agriculture	1141 NW
AN/030/0013/053	A E Lenton Limited	TF 47542 59413	Surface Water	Agriculture	794 NW
AN/030/0013/053	A E Lenton Limited	TF 46188 57309	Surface Water	Agriculture	403 NW
AN/030/0013/053	A E Lenton Limited	TF 46049 57653	Surface Water	Agriculture	667 NW
AN/030/0013/053	A E Lenton Limited	TF 45755 57643	Surface Water	Agriculture	927 NW
AN/030/0013/053	A E Lenton Limited	TF 45473 57631	Surface Water	Agriculture	1186 NW
AN/030/0013/053	A E Lenton Limited	TF 45709 57960	Surface Water	Agriculture	1118 NW

204. Volume 2, Figure 24.5.6 shows the location of abstractions which are recorded within the study area for this segment.

205. There are no registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Designated Sites

206. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

207. There are no ecological designations located within the study area for this segment.

24.4.3.7 ECC 7: Fodder Dike Bank/Fen Bank to Broadgate

Hydrological Setting

208. The Fodder Dike Bank/Fen Bank to Broadgate segment lies within the wider Fens East and West Operational Catchment. On a small scale, the majority of the segment is drained by East and West Fen Drains (ordinary watercourse), which has an entire catchment area of 371.8 km^2.

209. There are no other Main Rivers within this segment.

210. The drainage board with responsibility for land within this segment is W4IDB. There are several W4IDB maintained watercourses within this segment including Cranberry, Small End, Skirmore, Claxey, Wrangle Bank to Low Road and Black Bull to Ash Cottage. Wrangle pumping station located approximately 3.9km southeast of the onshore ECC.

211. The significant watercourses within this segment are shown in Volume 2, Figure 24.4.7.

Watercourse Sensitivity

212. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

213. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

214. There is limited groundwater beneath the segment within the Unproductive bedrock aquifers of the Kimmeridge Clay Formation. Superficial deposits underlying the segment comprises of Tidal Flat Deposits. These deposits are classified as Unproductive aquifers.

215. The segment is not designated as a SPZ.

216. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.7.

Groundwater Sensitivity

217. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

218. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

219. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).

220. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.

221. The flood zones for this segment are shown within Volume 2, Figure 25.4.7.

222. Surface water flood risk mapping produced by the Environment Agency indicates there are limited areas in the segment at potential risk of inundation from extreme rainfall. These areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

223. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradients into open drainage ditches/ streams or the main watercourse network.

224. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

225. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

226. The water body catchment in this segment is:

- East and West Fen Drains:
  - ecological status: bad; and
  - chemical status: fail.

Groundwater Quality

227. Under the Anglian RBMP there are no monitored groundwater bodies within the river basin area associated with this segment of the onshore ECC.

Pollution Events

228. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within segment this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

229. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.7 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

230. Table 24.9 shows permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.9 Permitted abstractions for segment ECC 7

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
AN/030/0013/053	A E Lenton Limited	TF 45501 54418	Surface Water	Agriculture	226 S
AN/030/0013/053	A E Lenton Limited	TF 44846 56457	Surface Water	Agriculture	799 NW
AN/030/0013/099	M Leggate and Sons	TF 43621 55609	Surface Water	Agriculture	1332 NW

231. Volume 2, Figure 24.5.7 shows the location of abstractions which are recorded within the study area for this segment.

232. There are no registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Designated Sites

233. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

234. There is one ecological designation located within 2km of the segment. This consists of the following statutory designation:

- Wrangle Brick Pits – Local Wildlife Site.

24.4.3.8 ECC 8: Broadgate to Ings Drove

Hydrological Setting

235. The Broadgate to Ings Drove segment lies within the wider Fens East and West Operational Catchment. On a small scale, the segment is drained by East and West Fen Drains (ordinary watercourse), which has an entire catchment area of 371.8 km^2.

236. The drainage board within this segment is W4IDB. There are several W4IDB maintained watercourses within the segment, including the following drainage channels: Kirton Dale, Pinders Bridge to Joy Hill, Eel Pool to Pinders & West Branch from Low Lane, Low Lane, White Horse, Fold Hill to Ivy House, Faunt Bridge Caleb Hill-Wiken Lane, Leake Main, Pode Lane, Leverton Sewer. There are no pumping stations within this segment.

237. The significant watercourses within this segment are shown in Volume 2, Figure 24.4.8.

Watercourse Sensitivity

238. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

239. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

240. There is limited groundwater beneath the segment within the Unproductive bedrock aquifers of the Kimmeridge Clay Formation. Superficial deposits underlying the segment comprises of Tidal Flat Deposits. These deposits are classified as Unproductive aquifers.

241. The segment is not designated as a SPZ.

242. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.8.

Groundwater Sensitivity

243. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

244. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

245. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).

246. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.

247. The flood zones for this segment are shown within Volume 2, Figure 25.4.8.

248. Surface water flood risk mapping produced by the Environment Agency indicates there are limited areas in the segment at potential risk of inundation from extreme rainfall. These areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

249. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradients into open drainage ditches/ streams or the main watercourse network.

250. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

251. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

252. The water body catchment in this segment is:

- East and West Fen Drains:
  - ecological status: bad; and
  - chemical status: fail.

Groundwater Quality

253. Under the Anglian RBMP there are no monitored groundwater bodies within the river basin area associated with this segment of the onshore ECC.

Pollution Events

254. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within segment this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

255. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.8 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

256. Table 24.10 shows permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.10 Permitted abstractions for segment ECC 8

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
AN/030/0013/099	M Leggate and Sons	TF 42461 53539	Surface Water	Agriculture	606 N
AN/030/0013/099	M Leggate and Sons	TF 42570 53146	Surface Water	Agriculture	209 N
AN/030/0013/099	M Leggate and Sons	TF 42505 53045	Surface Water	Agriculture	112 N
AN/030/0013/099	M Leggate and Sons	TF 42420 52925	Surface Water	Agriculture	46 N
AN/030/0013/099	M Leggate and Sons	TF 42398 52838	Surface Water	Agriculture	1 N
AN/030/0013/099	M Leggate and Sons	TF 42078 52047	Surface Water	Agriculture	398 S
AN/030/0013/099	M Leggate and Sons	TF 42088 52066	Surface Water	Agriculture	391 S
AN/030/0013/099	M Leggate and Sons	TF 42210 51646	Surface Water	Agriculture	794 S
AN/030/0013/099	M Leggate and Sons	TF 42183 51467	Surface Water	Agriculture	933 S
AN/030/0013/099	M Leggate and Sons	TF 38674 49845	Surface Water	Agriculture	within Order Limits
AN/030/0013/033	Staples Bros Ltd	TF 38871 49218	Surface Water	Agriculture	490 SE
AN/030/0013/099	M Leggate and Sons	TF 38870 49150	Surface Water	Agriculture	525 SE
AN/030/0013/099	M Leggate and Sons	TF 42360 52746	Surface Water	Agriculture	within Order Limits

257. Volume 2, Figure 24.5.8 shows the location of abstractions which are recorded within the study area for this segment.

258. There are no registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Designated Sites

259. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

260. There are no ecological designations located within the study are for this segment.

24.4.3.9 ECC 9: Ings Drove to Church End Lane

Hydrological Setting

261. The Ings Drove to Church End Lane segment lies within the wider Fens East and West Operational Catchment. On a small scale, the segment is drained by East and West Fen Drains (ordinary watercourse), which has an entire catchment area of 371.8 km^2.

262. The drainage board within this segment is W4IDB. There are several W4IDB maintained watercourses within this segment, including the following drainage channels: Westlands, Scott Dyke, Butterwick Ings, Butterwick Cut, Poynton Hill, and Caythorpe House to Sea Bank. There are no pumping stations within this segment.

263. The significant watercourses within this segment are shown in Volume 2, Figure 24.4.9.

Watercourse Sensitivity

264. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

265. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

266. There is limited groundwater beneath the segment within the Unproductive bedrock aquifers of the Kimmeridge Clay Formation and Ampthill Clay Formation. Superficial deposits underlying the segment comprises of Tidal Flat Deposits. These deposits are classified as Unproductive aquifers.

267. The segment is not designated as a SPZ.

268. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.9.

Groundwater Sensitivity

269. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

270. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

271. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).

272. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.

273. The flood zones for this segment are shown within Volume 2, Figure 25.4.9.

274. Surface water flood risk mapping produced by the Environment Agency indicates there are limited areas in the segment at potential risk of inundation from extreme rainfall. These areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

275. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradients into open drainage ditches/ streams or the main watercourse network.

276. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

277. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

278. The water body catchment in this segment is:

- East and West Fen Drains:
  - ecological status: bad; and
  - chemical status: fail.

Groundwater Quality

279. Under the Anglian RBMP there are no monitored groundwater bodies within the river basin area associated with this segment of the onshore ECC.

Pollution Events

280. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within segment this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

281. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.9 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

282. Table 24.11 shows permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.11 Permitted abstractions for segment ECC 9

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
AN/030/0013/033	Staples Bros Ltd	TF 37352 50306	Surface Water	Agriculture	1279 NW
AN/030/0013/033	Staples Bros Ltd	TF 37773 50265	Surface Water	Agriculture	925 NW
AN/030/0013/099	M Leggate and Sons	TF 38151 49785	Surface Water	Agriculture	341 NW
AN/030/0013/033	Staples Bros Ltd	TF 38701 49218	Surface Water	Agriculture	346 SE
AN/030/0013/033	Staples Bros Ltd	TF 39383 48619	Surface Water	Agriculture	1241 SE
AN/030/0013/028	TH Clements & Son Limited	TF 38390 47300	Surface Water	Agriculture	561 E
AN/030/0013/028	TH Clements & Son Limited	TF 38440 44015	Surface Water	Agriculture	68 E
AN/030/0013/033	Staples Bros Ltd	TF 37171 49952	Surface Water	Agriculture	1226 NW
AN/030/0013/044	R Hardy (Vegetables) Ltd	TF 37054 49051	Surface Water	Agriculture	701 NW
AN/030/0013/033	Staples Bros Ltd	TF 37060 49030	Surface Water	Agriculture	690 NW
AN/030/0013/044	R Hardy (Vegetables) Ltd	TF 36914 48303	Surface Water	Agriculture	444 NW
AN/030/0013/033	Staples Bros Ltd	TF 36900 48210	Surface Water	Agriculture	428 NW
AN/030/0013/033	Staples Bros Ltd	TF 36825 47830	Surface Water	Agriculture	570 NW
AN/030/0013/028	TH Clements & Son Limited	TF 36765 47651	Surface Water	Agriculture	642 NW
AN/030/0013/044	R Hardy (Vegetables) Ltd	TF 36597 46690	Surface Water	Agriculture	291 W
AN/030/0013/044	R Hardy (Vegetables) Ltd	TF 36480 46120	Surface Water	Agriculture	484 W

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
AN/030/0013/044	R Hardy (Vegetables) Ltd	TF 35092 46310	Surface Water	Agriculture	1833 W
AN/030/0013/044	R Hardy (Vegetables) Ltd	TF 35119 46168	Surface Water	Agriculture	1826 W
AN/030/0013/028	TH Clements & Son Limited	TF 36465 46042	Surface Water	Agriculture	510 W
AN/030/0013/028	TH Clements & Son Limited	TF 36461 45651	Surface Water	Agriculture	569 W
AN/030/0013/044	R Hardy (Vegetables) Ltd	TF 36470 45650	Surface Water	Agriculture	560 W
AN/030/0013/045	R Hardy (Vegetables) Ltd	TF 36550 45220	Surface Water	Agriculture	617 W
AN/030/0013/028	TH Clements & Son Limited	TF 36551 45204	Surface Water	Agriculture	624 W
AN/030/0013/045	R Hardy (Vegetables) Ltd	TF 36623 44850	Surface Water	Agriculture	683 W
AN/030/0013/044	R Hardy (Vegetables) Ltd	TF 36724 44301	Surface Water	Agriculture	938 W
AN/030/0013/028	TH Clements & Son Limited	TF 36770 44080	Surface Water	Agriculture	1030 W

283. Volume 2, Figure 24.5.9 shows the location of abstractions which are recorded within the study area for this segment.

284. There are no registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Designated Sites

285. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

286. There are no ecological designations located within the study area for this segment.

24.4.3.10 ECC 10: Church End Lane to The Haven

Hydrological Setting

287. The Church End Lane to The Haven segment lies within the wider Fens East and West Operational Catchment. On a small scale, the segment is drained by East and West Fen Drains (ordinary watercourse), which has an entire catchment area of 371.8 km^2.

288. Other watercourses within or serving this segment include Hobhole Drain, The Haven and The Graft.

289. The drainage board within this segment is W4IDB. There are several W4IDB maintained watercourses and pumping stations within this segment, including the following drainage channels: Freiston Main, Clampgate (2) East Branch, New Tunnel to Tamworth, Grovefield Lane to Sea Bank, Fishtoft Marsh North, Woad Lane, Hobhole Drain, Southfields Lane and The Graft. The pumping stations include:

- Hobhole electric pumping station located approximately 500m southeast of the onshore ECC serving Hobhole Drain; and
- Hobhole pumping station located approximately 650m southeast of the onshore ECC serving Hobhole Drain.

290. The significant watercourses within this segment are shown in Volume 2, Figure 24.4.10.

Watercourse Sensitivity

291. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

292. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

293. There is limited groundwater beneath the segment within the Unproductive bedrock aquifers of the Ampthill Clay Formation. Superficial deposits underlying the segment comprises of Tidal Flat Deposits. These deposits are classified as Unproductive aquifers.

294. The segment is not designated as a SPZ.

295. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.10.

Groundwater Sensitivity

296. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

297. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

298. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).

299. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.

300. The flood zones for this segment are shown within Volume 2, Figure 25.4.10.

301. Surface water flood risk mapping produced by the Environment Agency indicates there are limited areas in the segment at potential risk of inundation from extreme rainfall. These areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

302. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradients into open drainage ditches/ streams or the main watercourse network.

303. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

304. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

305. The water body catchment in this segment is:

- East and West Fen Drains:
  - ecological status: bad; and
  - chemical status: Fail.

Groundwater Quality

306. Under the Anglian RBMP there are no monitored groundwater bodies within the river basin area associated with this segment of the onshore ECC.

Pollution Events

307. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within segment this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

308. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.10 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

309. Table 24.12 shows permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.12 Permitted abstractions for segment ECC 10

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
AN/030/0013/076	M Leggate and Sons (Produce) Ltd	TF 36880 43435	Surface Water	Agriculture	719 W
AN/030/0013/028	TH Clements & Son Limited	TF 35945 43315	Surface Water	Agriculture	1550 W
AN/030/0013/044	R Hardy (Vegetables) Ltd	TF 36459 40021	Surface Water	Agriculture	483 SE

310. Volume 2, Figure 24.5.10 shows the location of abstractions which are recorded within the study area for this segment.

311. There are no registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Designated Sites

312. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

313. There are several ecological designations located within the study area for this segment. These consists of the following statutory designations:

- The Wash – SPA, Ramsar, SSSI, Special Area of Conservation (SAC);
- Freiston Shore – RSPB Reserve;
- Havenside – Local Nature Reserve (LNR), Local Wildlife Site;
- Hobhole Drain, Baker's Bridge South – Local Wildlife Site; and
- Hobhole Bank – Local Wildlife Site.

24.4.3.11 ECC 11: The Haven to Marsh Road

Hydrological Setting

314. The Haven to Marsh Road segment lies within the wider South Forty Foot Drain Operational Catchment. On a small scale, the segment is drained by two watercourses:

315. Black Sluice IDB draining to the South Forty Foot Drain (ordinary watercourse), which has an entire catchment area of 447.2 km^2; and

316. Kirton Marsh Drain (ordinary watercourse), which has an entire catchment area of 15.7 km^2.

317. Other watercourses in this segment include The Haven, Craile Eau, Boundary Drain and Wyberton Branch Drain.

318. The drainage board within this segment is Black Sluice IDB (BSIDB). There are several BSIDB maintained watercourses and pumping stations within and serving this segment including Wyberton Marsh Pump Drain, Wyberton Frampton Boundary Drain, Wyberton Branch Drain, Junction Drain, Frampton Towns Drain, Branch South, Craile Eau and Branch Northwest. The pumping stations include:

- Wyberton Marsh pumping station located approximately 100m northeast of the onshore ECC, serving Wyberton Marsh Pump Drain; and
- Kirton & Frampton Marsh pumping station located approximately 1,500m east of the onshore ECC serving Kirton Drain and Frampton Marsh.

319. The significant watercourses within this segment are shown in Volume 2, Figure 24.4.11.

Watercourse Sensitivity

320. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

321. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

322. There is limited groundwater beneath the segment within the Unproductive bedrock aquifers of the Ampthill Clay Formation and West Walton Formation. Superficial deposits underlying the segment comprises of Tidal Flat Deposits. These deposits are classified as Unproductive aquifers.

323. The segment is not designated as a SPZ.

324. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.11.

Groundwater Sensitivity

325. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

326. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

327. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).

328. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.

329. The flood zones for this segment are shown within Volume 2, Figure 25.4.11.

330. Surface water flood risk mapping produced by the Environment Agency indicates there are some areas in the segment at risk at potential risk of inundation from extreme rainfall. These areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

331. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradients into open drainage ditches/ streams or the main watercourse network.

332. The majority of the segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs. However, a small area to the north of the segment between Wyberton Road and Break House Farm lies within an area at risk of flooding from reservoirs, associated with Wyberton Marsh pumping station.

Floodplain Sensitivity

333. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

334. The water body catchments in this segment are:

- Black Sluice IDB draining to the South Forty Foot Drain
  - ecological status: moderate; and
  - chemical status: fail.
- Kirton Marsh Drain
  - ecological status: good; and
  - chemical status: fail.

Groundwater Quality

335. Under the Anglian RBMP there are no monitored groundwater bodies within the river basin area associated with this segment of the onshore ECC.

Pollution Events

336. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within segment this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

337. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.11 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

338. Table 24.13 shows permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.13 Permitted abstractions for segment ECC 11

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
A E Lenton Limited	AN/030/0012/004	TF 35443 40120	Surface Water	Agriculture	5 N
RSPB	4/30/12/*S/0295	TF 35210 39740	Surface Water	Environmental	118 N

339. Volume 2, Figure 24.5.11 shows the location of abstractions which are recorded within the study area for this segment.

340. There are no registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Designated Sites

341. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

342. There are several ecological designations located within the study area for this segment. These consists of the following statutory designations:

- The Wash – SPA, Ramsar, SSSI, SAC;
- The Wash – National Nature Reserve;
- Frampton Marsh – RSPB Reserve;
- Frampton Marsh – Local Wildlife Trust;
- Slippery Gowt Sea Bank – Local Wildlife Site; and
- Frampton Hall – Local Wildlife Site.

24.4.3.12 ECC 12: Marsh Road to Fosdyke Bridge

Hydrological Setting

343. The northern part of the Marsh Road to Fosdyke Bridge segment lies within the wider South Forty Foot Drain Operational Catchment. On a smaller scale, the northern part of the segment is drained by Kirton Marsh Drain (ordinary watercourse), which has an entire catchment area of 15.7 km^2. The southern part of the segment lies within the wider Welland Operational Catchment. On a smaller scale, the southern part of the segment is drained by the Fosdyke Bridge Outfall (ordinary watercourse), which has an entire catchment area of 35.5 km^2.

344. The drainage board within the northern part of this segment is BSIDB. There are several BSIDB maintained watercourses within the northern part of the segment including Kirton Drain, which is served by Kirton Marsh pumping station, located approximately 550m east of the onshore ECC. The drainage board with responsibility for land within the southern part of this segment is Welland and Deepings IDB (WDIDB). There are several WDIDB maintained watercourses within the southern part of this segment, including Main Drain and Roman Bank Drain. The pumping stations include:

- Kirton Marsh pumping station located approximately 550m east of the onshore ECC, serving Kirton Drain; and
- Fosdyke Marsh pumping station located approximately 900m east of the onshore ECC, serving Fosdyke Marsh.

345. The significant watercourses within this segment are shown in Volume 2, Figure 24.4.12.

Watercourse Sensitivity

346. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

347. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

348. There is limited groundwater beneath the segment within the Unproductive bedrock aquifers of the West Walton Formation and Oxford Clay Formation. Superficial deposits underlying the segment comprises of Tidal Flat Deposits. These deposits are classified as Unproductive aquifers.

349. The segment is not designated as a SPZ.

350. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.12.

Groundwater Sensitivity

351. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

352. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

353. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).

354. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.

355. The flood zones for this segment are shown within Volume 2, Figure 25.4.12.

356. Surface water flood risk mapping produced by the Environment Agency indicates there are some areas in the segment at risk at potential risk of inundation from extreme rainfall. These areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

357. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradients into open drainage ditches/ streams or the main watercourse network.

358. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

359. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

360. The water body catchments in this segment are:

- Kirton Marsh Drain
  - ecological status: good
  - chemical status: fail.
- Fosdyke Bridge Outfall
  - ecological status: bad
  - chemical status: fail.

Coastal/Transitional Water Quality

361. The estuarine transitional waters are monitored as the Welland transitional waterbody which has moderate ecological status and fail for chemical status.

Groundwater Quality

362. Under the Anglian RBMP there are no monitored groundwater bodies within the river basin area associated with this segment of the onshore ECC.

Pollution Events

363. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within segment this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

364. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.12 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

365. Table 24.14 shows permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.14 Permitted abstractions for segment ECC 12

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
AN/030/0013/088	Beeswax Dyson Farming Limited	TF 34837 33257	Surface Water	Agriculture	1837 SE
AN/031/0014/024/R01	Jack Buck (Farms) Limited	TF 34398 32522	Surface Water	Agriculture	1649 SE

366. Volume 2, Figure 24.5.12 shows the location of abstractions which are recorded within the study area for this segment.

367. There are no registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Designated Sites

368. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

369. There are several ecological designations located within the study area for this segment. These consists of the following statutory designations:

- The Wash – SPA, Ramsar, SSSI, SAC;
- The Wash – National Nature Reserve; and
- Moulton Marsh – Local Wildlife Site.

24.4.3.13 ECC 13: Fosdyke Bridge to Surfleet Marsh OnSS/Marsh Drove

Hydrological Setting

370. The majority of the segment lies within the wider Welland Operational Catchment. On a smaller scale, the segment is drained by two watercourses:

- Fosdyke Bridge Outfall (ordinary watercourse), which has an entire catchment area of 35.5 km^2; and
- Risegate Eau (ordinary watercourse), which has an entire catchment area of 38.7 km^2

371. The segment also partially lies within the wider Glens Operational Catchment, which at this location is drained by the River Glen, which has an entire catchment area of 57 km^2.

372. Other watercourses within this segment include the River Welland, Vernatt's Drain and the River Glen.

373. The drainage board within this segment is WDIDB. There are several WDIDB maintained watercourses within and serving this segment including Five Towns Drain, Risegate Eau and Surfleet Marsh Drain. The pumping stations include:

- Five Towns pumping station located 140m south of the onshore ECC, serving Five Towns Drain; and
- Risegate Eau pumping station located 120m south of the onshore ECC, serving Risegate Eau.

374. The significant watercourses within this segment are shown in Volume 2, Figure 24.4.13.

Watercourse Sensitivity

375. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

376. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

377. There is limited groundwater beneath the segment within the Unproductive bedrock aquifers of the Oxford Clay Formation. Superficial deposits underlying the segment comprises of Tidal Flat Deposits. These deposits are classified as Unproductive aquifers.

378. The segment is not designated as a SPZ.

379. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.13.

Groundwater Sensitivity

380. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

381. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

382. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).

383. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced.

384. The flood zones for this segment are shown within Volume 2, Figure 25.4.13.

385. Surface water flood risk mapping produced by the Environment Agency indicates there are some areas in the segment at risk at potential risk of inundation from extreme rainfall. These areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

386. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradients into open drainage ditches/ streams or the main watercourse network.

387. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

388. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

389. The water body catchments in this segment are:

- Fosdyke Bridge Outfall
  - ecological status: bad; and
  - chemical status: fail.
- Risegate Eau
  - ecological status: poor; and
  - chemical status: fail.

Coastal/Transitional Water Quality

390. The estuarine transitional waters are monitored as the Welland transitional waterbody which has moderate ecological status and fail for chemical status.

Groundwater Quality

391. Under the Anglian RBMP there are no monitored groundwater bodies within the river basin area associated with this segment of the onshore ECC.

Pollution Events

392. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

393. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.13 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

394. Table 24.15 shows permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.15 Permitted abstractions for segment ECC 13

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
5/31/14/*S/0109	E & J Sneath	TF 28856 33787	Surface Water	Agriculture	1547 N
5/31/14/*S/0109	E & J Sneath	TF 29535 32934	Surface Water	Agriculture	912 N
5/31/14/*S/0109	E & J Sneath	TF 29265 32758	Surface Water	Agriculture	621 N
5/31/14/*S/0109	E & J Sneath	TF 284 329	Surface Water	Agriculture	560 N
5/31/14/*S/0109	E & J Sneath	TF 29396 31845	Surface Water	Agriculture	137 N
5/31/14/*S/0109	E & J Sneath	TF 29220 31842	Surface Water	Agriculture	within Order Limits
5/31/14/*S/0109	E & J Sneath	TF 28537 31806	Surface Water	Agriculture	50 N
5/31/14/*S/0176	John Grant (Donington)	TF 27900 31775	Surface Water	Agriculture	7 N
5/31/14/*S/0176	John Grant (Donington)	TF 27051 31735	Surface Water	Agriculture	193 W
5/31/14/*S/0169	Proctor Bros (Gosberton) Ltd	TF 25700 31465	Surface Water	Agriculture	1327 W
AN/030/0012/047	R Bratley (Quadring) Ltd	TF 25638 31451	Surface Water	Agriculture	1387 W

395. Volume 2, Figure 24.5.13 shows the location of abstractions which are recorded within the study area for this segment.

396. There are no registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Designated Sites

397. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

398. There are several ecological designations located within 2km of the segment. These consist of the following statutory designations:

- South Bank Fosdyke – Local Wildlife Site;
- Surfleet Bank – Local Wildlife Site;
- Surfleet Seas End Saltmarsh – Local Wildlife Site;
- Blue Gowt Drain, North – Local Wildlife Site;
- River Glen Corridor – Local Wildlife Site;
- A16 Verges North of the River Glen – Local Wildlife Site; and
- Risegate Eau – Local Wildlife Site.

24.4.3.14 ECC 14: Surfleet Marsh OnSS/Marsh Drove to Connection Area.

Hydrological Setting

399. The majority of the segment lies within the wider Welland Operational Catchment. On a smaller scale, the segment is drained by two watercourses:

- Whaplode River (ordinary watercourse), which has an entire catchment area of 68.8 km^2; and
- Moulton River (ordinary watercourse), which has an entire catchment area of 24.3 km^2.

400. The segment also partially lies within the wider Glens Operational Catchment, which at this location is drained by the River Glen, which has an entire catchment area of 57 km^2.

401. Other watercourses within or serving this segment include the River Welland, which the onshore ECC crosses to the Weston Marsh Substation Search Area (South), Lords Drain and Dominorum Drain.

402. The drainage board within the northern part of this segment is WDIDB and in southern part of this segment (south of the River Welland) is South Holland Internal Drainage Board (SHIDB). The pumping stations include:

- Lords Drain pumping station located 575m north-east of the onshore ECC, serving Lord Drain Drain; and
- Surfleet Marsh pumping station located 885m west of the onshore ECC, serving Surfleet Marsh Drain.

403. The significant watercourses within this segment are shown in Volume 2, Figure 24.4.14.

Watercourse Sensitivity

404. Sensitivities have been assigned to all watercourses within the study area as defined in Table 24.17.

Geological and Hydrogeological Setting

405. The geological and hydrogeological setting, and ground conditions of this segment are described in detail within Chapter 23 (document reference 6.1.23).

406. There is limited groundwater beneath the segment within the Unproductive bedrock aquifers of the Oxford Clay Formation. Superficial deposits underlying the segment comprises of Tidal Flat Deposits. These deposits are classified as Unproductive aquifers.

407. The segment is not designated as a SPZ.

408. The aquifer designations and SPZs for this segment are shown within Volume 2, Figure 24.5.14.

Groundwater Sensitivity

409. Sensitivities have been assigned to all groundwater bodies beneath the study area, as defined in Table 24.17.

Flood Risk

410. Fluvial and tidal flood risk mapping shows the segment wholly lies within Flood Zone 3.

411. The Lincolnshire coastline is served by a range of coastal flood defences. The defences run parallel to the coastline and protect the onshore ECC against tidal flooding for at least a 1 in 200-year event (0.5% Annual Exceedance Probability (AEP)).

412. There are numerous watercourses that could also pose a localised fluvial risk to the onshore ECC, however due to the proximity of the onshore ECC to the coast, it is noted that the majority of these watercourses will be tidally influenced. Flood defences are located along the River Welland to the north of the segment, in the form of embankments, with varied effective crest levels and design standard of protections along the length of the river.

413. The flood zones for this segment are shown within Volume 2, Figure 25.4.14.

414. Surface water flood risk mapping produced by the Environment Agency indicates there are some areas in the segment at risk at potential risk of inundation from extreme rainfall. These areas are limited to small areas of topographical lows which could theoretically hold water during extreme rainfall events and are not associated with any significant overland flow path routes.

415. Given the predominantly agricultural, greenfield, nature of the land on which the segment is located, there is unlikely to be formal drainage infrastructure controlling runoff from these areas, apart from the presence of field drains/drainage ditches. During a rainfall event, surface water would infiltrate into the ground or, if the soil is saturated, flow over the surface in an uncontrolled manner, ponding in topographic lows or following the local topographic gradients into open drainage ditches/ streams or the main watercourse network.

416. The segment does not lie within an area at risk of flooding from breach or overtopping of reservoirs.

Floodplain Sensitivity

417. Sensitivity has been assigned to the floodplains within the study area, as defined in Table 24.17.

Water Quality

River Water Quality

418. The water body catchments in this segment are:

- Whaplode River
  - ecological status: moderate; and
  - chemical status: fail.
- Moulton River
  - ecological status: moderate; and
  - chemical status: fail.

Coastal/Transitional Water Quality

419. The estuarine transitional waters are monitored as the Welland transitional waterbody which has moderate ecological status and fail for chemical status.

Groundwater Quality

420. Under the Anglian RBMP there are no monitored groundwater bodies within the river basin area associated with this segment of the onshore ECC.

Pollution Events

421. Envirocheck reporting has identified pollution incidents to controlled waters within the study area. Pollution incidents to controlled waters have been recorded at numerous locations within the study area. All incidents recorded within segment this segment are isolated incidents over 20 years old and as such are not considered significant.

Discharge Consents

422. Envirocheck reporting has identified discharge consents which are recorded within hydrology, hydrogeology and flood risk study area. Volume 2, Figure 24.5.14 shows the location of licensed discharge consents which are recorded within the study area for this segment.

Abstractions

423. Table 24.16 shows permitted abstractions recorded within the hydrology, hydrogeology and flood risk study area for this segment.

Table 24.16 Permitted abstractions for segment ECC 14

Licence	Holder	Location	Source	Use	Distance from Order Limits (m)
5/31/14/*S/0264	George Hay & Sons Ltd	TF 29999 30220	Surface Water	Agriculture	260 S
5/31/14/*S/0247	Lincolnshire Field Products Ltd	TF 2701 2709	Surface Water	Agriculture	1730 W

424. Volume 2, Figure 24.5.14 shows the location of abstractions which are recorded within the study area for this segment.

425. There are no registered private water supply users within the hydrology, hydrogeology and flood risk study area for this segment.

Designated Sites

426. The ecological setting of this segment is described in detail within Chapter 21 (document reference 6.1.21), Chapter 22 (document reference 6.1.22) and Chapter 23 (document reference 6.1.23).

427. There are several ecological designations located within the study area for this segment. These consist of the following statutory designations:

- The Wash – SPA, Ramsar, SSSI, SAC;
- Moulton Marsh – Local Wildlife Site;
- Moulton River – Local Wildlife Site;
- Pinchbeck Marsh – Local Wildlife Site;
- Surfleet Seas End Saltmarsh – Local Wildlife Site;
- Surfleet Bank – Local Wildlife Site; and
- South Bank Fosdyke – Local Wildlife Site.

24.4.4 Baseline Sensitivity

428. Sensitivity values have been assigned to potential receptors, as presented in Table 24.17. Overall, the watercourse receptors range in sensitivity from **low** to **medium**; the near-shore coastal waters of the North Sea are considered to have a **high** sensitivity; areas of floodplain within the study area are considered to be of a low sensitivity; and groundwater bodies have a **high** or **medium** sensitivity. For the purpose of assessment, individual receptors may be grouped by type (e.g., all watercourses are assessed as a receptor against the potential for impact on water quality).

Table 24.17: Sensitivity values for potential receptors

Receptor	Value (Sensitivity)	Justification
Anderby Main Drain	Medium	Ordinary watercourse of local importance, not monitored under the WFD. Passes through local wildlife sites at coast.
Boygrift Drain	Medium	Ordinary watercourse of local importance, not monitored under the WFD.
Willoughby High Drain	Medium	Main River watercourse monitored under the WFD with moderate ecological status and fail chemical status. Watercourse of local importance.
Ingoldmells Main Drain	Medium	Main River watercourse monitored under the WFD with moderate ecological status and fail chemical status. Watercourse of local importance.
Wedlands and North Drains	Medium	Ordinary watercourse monitored under the WFD with moderate ecological status and fail chemical status. Watercourse of local importance.
Cow Bank Drain	Medium	Ordinary watercourse monitored under the WFD with moderate ecological status and fail chemical status. Watercourse of local importance.
Lymn/Steeping	Medium	Main River watercourse monitored under the WFD with moderate ecological status and fail chemical status. Watercourse of local importance.
East and West Fen Drains	Low	Ordinary watercourse monitored under the WFD with bad ecological status and fail chemical status.
Kirton Marsh Drain	Medium	Ordinary watercourse monitored under the WFD with good ecological status and fail chemical status. Watercourse of local importance.
Black Sluice IDB draining to the South Forty Foot Drain	Medium	Ordinary watercourse monitored under the WFD with good ecological status and fail chemical status. Watercourse of local importance.
Fosdyke Bridge Outfall	Low	Ordinary watercourse monitored under the WFD with bad ecological status and fail chemical status.
Risegate Eau	Low	Ordinary watercourse monitored under the WFD with poor ecological status and fail chemical status.
Whaplode River	Medium	Ordinary watercourse monitored under the WFD with moderate ecological status and fail chemical status. Watercourse of local importance.
Moulton River	Medium	Ordinary watercourse monitored under the WFD with moderate ecological status and fail chemical status. Watercourse of local importance.
River Glen	Medium	Main River watercourse monitored under the WFD with moderate ecological status and fail chemical status. Watercourse of local importance.

Receptor	Value (Sensitivity)	Justification
Non-Main River watercourses not monitored under WFD	Negligible	Ordinary watercourses not monitored under the WFD. Watercourses of limited local importance.
Groundwater within the Burnham Chalk Formation and Welton Chalk Formation	High	Bedrock aquifer is a Principal aquifer designated as SPZ.
Groundwater within the Claxby Ironstone Formation, Tealby Formation and Roach Formation	Low	Bedrock aquifer is a Secondary A or Secondary B aquifer.
Spilsby Sandstone Formation	High	Bedrock aquifer is a Principal aquifer designated as SPZ
Kimmeridge Clay Formation, Ampthill Clay Formation, West Walton Formation and Oxford Clay Formation	Negligible	Non-productive geology in terms of groundwater resource.
Groundwater within the Tidal Flat Deposits, Till and Glaciofluvial Deposits	Negligible	Non-productive geology in terms of groundwater resource.
Areas of floodplain within the study area	Low	Large proportion of the study area is within Flood Zone 3, i.e., within the tidal and fluvial floodplain; The tidal and fluvial floodplain within the study area is located on land uses which are undeveloped with few buildings. There are no urbanised areas within the areas of floodplain that are within the study area. All land uses are 'less vulnerable'. The tidal and fluvial floodplain within the study area is relatively wide and accommodates a large volume of water relative to the volume potentially displaced/increased by the proposed onshore infrastructure. It is considered to have a low sensitivity in terms of changes in flood levels and floodplain shape.
Lincolnshire coastal water body	High	Assessed water body under River Basin Management Plan/ WFD. Coastal waters form part of the Greater Wash SPA. Bathing water quality at the coastline is classified as excellent.
Witham transitional waterbody	Low	Assessed water body under River Basin Management Plan/ WFD with bad ecological status and fail for chemical status.

Receptor	Value (Sensitivity)	Justification
		Drains to the Greater Wash SPA.
Welland transitional waterbody	Low	Assessed water body under River Basin Management Plan/ WFD with moderate ecological status and fail for chemical status. Drains to the Greater Wash SPA.

24.4.5 Future Baseline

429. The baseline will evolve over a period of time regardless of the Project. The most significant change with regard to hydrology, hydrogeology and flood risk will be due to climate change and the impact of this change on hydrological regimes and flooding. Guidance is provided by the Environment Agency with regard to the anticipated changes in rainfall intensity, peak river flows and increases in sea levels and coastal action. These climatic changes and subsequent impacts are predicted to take place based on national and global modelling.

430. It is assumed that the Environment Agency will continue to work towards improvements in WFD classification for water bodies within the study area. This work may include strategies which would see physical geomorphological changes to existing surface water features; changes in local land use to improve chemical water quality of runoff reaching monitored water bodies; and/ or other schemes such as ecological improvement projects which could impact on existing surface water quality.

24.5 Basis of Assessment

24.5.1 Scope of the Assessment

24.5.1.1 Impacts Scoped in for Assessment

431. The following impacts have been scoped into this assessment:

- Construction:
  - Generation of turbid runoff which could enter the water environment;
  - Changes to surface water runoff patterns which could affect flood risk;
  - Potential for damage to flood defence or surface water drainage infrastructure; and
  - Pollution or disruption of flow to groundwater through ground excavations or piling.
- Operation and maintenance:
  - Changes to surface water drainage at the OnSS location.
- Decommissioning:
  - Generation of turbid runoff which could enter the water environment; and
  - Potential for damage to flood defence or surface water drainage infrastructure, including potential impact on the future maintenance or improvement works to flood defences.

24.5.1.2 Impacts Scoped out of Assessment

432. Impacts were scoped out of the assessment in line with feedback provided through the Scoping Opinion (The Planning Inspectorate, 2022), Section 42 responses and further consultation through the EPP. The embedded mitigation outlined in Section 24.5.3 has also been considered. The assessment's scope was also based on the receiving environment and expected parameters of the Project (Chapter 3 (document reference 6.1.3)), the expected scale of impact and the potential for a pathway for effect on the environment. The following impacts have been scoped out of the assessment:

- Construction:
  - Accidental spillages and leakages of oils, fuel and other polluting substances which could potentially enter the water environment.
- Operation and maintenance:
  - Accidental spillages and leakages of oils, fuel, and other polluting substances which could potentially enter the water environment; and
  - Any impact on WFD status for assessed surface water or groundwater bodies.
- Decommissioning:
  - Accidental spillages and leakages of oils, fuel, and other polluting substances which could potentially enter the water environment;
  - Pollution or disruption of flow to groundwater through ground excavations or piling (providing any piling remains in situ at the time of decommissioning).

24.5.2 Realistic Worst-Case Scenario

433. The following section identifies the Maximum Design Scenario (MDS) in environmental terms, defined by the project design envelope.

434. The MDS criteria identified in Table 24.18 have been selected as those aspects of the design which have the potential to result in the greatest effect on an identified receptor or receptor group. The MDS criteria have been selected from the project description details provided (Chapter 3 (document reference 6.1.3)). Effects of greater significance are not predicted to arise should any other development scenario, based on details within the project design envelope, to that assessed here be taken forward in the final design scheme. The MDS takes into consideration embedded mitigated as described in Table 24.19.

Table 24.18: Maximum design scenario for onshore hydrology, hydrogeology and flood risk for the Project alone

Potential effect	Maximum adverse scenario assessed	Justification
Construction		
Onshore ECC Increase in flood risk or change in water quality	For the assessment presented in this chapter, the onshore ECC represents a temporary construction corridor width of approximately 80m and 70km in length.	The MDS includes the maximum number of cables anticipated and assumes disturbance throughout the onshore ECC area, therefore the greatest area of land disturbance. Open trenching as a crossing option for smaller watercourse crossings has been considered to represent the greatest potential for change to surface hydrology and effect on water quality.
	Cables will be installed in ducts, with installation undertaken in sections. The cables will be installed in one trench per circuit (maximum number of 4 export cable circuits for 12 cables), with each trench up to 5m wide and up to 3m deep.	
	6 primary compounds and 19 secondary compounds would be located along the onshore ECC.	
	Joint bays buried below ground with a combined total area of 163,800 m^2 and link boxes with a combined total area of 12,600m^2.	
	Trenched crossing of smaller watercourses (see crossings register provided in Onshore Crossing Schedule (document reference 6.3.3.3).	
	Construction duration 42 months.	
OnSS Increase in flood risk or change in water quality	The OnSS includes the footprint of the substation infrastructure and development platform (including landscaping).	The MDS includes the maximum development footprint (temporary and permanent) and therefore the largest possible area of disturbance to surface water features.
	One logistics compound work area is included to accommodate offices, welfare facilities, car parking, workshops and storage areas. Indicative maximum area of 40,000 m^2 is assumed for the substation logistic compound. A commissioning phase compound with an area of 5,400 m^2 is also included.	
Trenchless construction techniques Increase in flood risk or change in water quality	Trenchless drilling (or alternative trenchless crossing technique) crossings required for landfall; larger surface watercourses; all IDB owned / maintained watercourses; flood defences; key roads; and some utility crossings.	HDD (or other trenchless crossing) techniques present a risk of indirectly contaminating surface watercourses or groundwater where they are hydraulically connected, with surface runoff caused by spillages and the movement of
	Trenchless drilling (or trenchless crossing) work areas would be located at each end of the crossing, requiring an associated TCC, either with permeable surfacing or suitable drainage where non permeable surfacing is used.	

Potential effect	Maximum adverse scenario assessed	Justification
		excavated earth/ sediments.
Landfall Increase in flood risk or change in water quality	Trenchless drilling (or alternative trenchless crossing technique) for up to 6 bores (one per circuit plus one spare) will be used from landfall to cross the coastal flood defence line.	The MDS includes the maximum number of cables anticipated at landfall and therefore, the maximum working corridor required. A number of access options for landfall are included in the MDS.
	Maximum trenchless burial depth of 25 m. Number of Transition Joint Bays (TJBs) up to 6. TJB construction area 1,242 m^2. Logistics compound 90,000 m^2. Construction duration 51 months.	
	A temporary landfall construction compound of up to 90,000 m2 and a temporary duct storage compound area of up to 37,000 m2.	
Operation and Maintenance		
OnSS Increase in flood risk	Permanent area of the OnSS footprint assumes an Air Insulated Switchgear (AIS) substation which has the greater footprint of 144,000m^2, and an impermeable area of 4.2ha. A Gas Insulated Switchgear (GIS) substation, which has a smaller footprint area than the AIS design of 72,600 m^2 would have a higher proportion of impermeable surfaces, but a total less that the 4.2ha for the AIS option.	The MDS for flood risk at the OnSS requires the largest footprint for design resulting in the largest possible area of disturbance and largest potential for impermeable ground cover.
OnSS Routine maintenance works affecting surface watercourses	Routine maintenance of the OnSS.	The MDS for water quality of main watercourses during operation is that chemicals and oils would be used in the routine maintenance of OnSS. The onshore ECC provides potential lateral pathways for water flow which could indirectly affect water quality.
	Permanent onshore cables will be buried (apart from joint bay access points and link box inspection covers).	
Decommissioning		
OnSS Change to flood risk	Removal of the OnSS including areas of hardstanding. Buried cables to be de-energized with the ends sealed and left in place to avoid ground disturbance. TJBs at landfall to be left in place. Any final decommissioning methodology will adhere to industry best practice, rules, and regulations at the time of decommissioning.	The MDS for flood risk on the surrounding environment during decommissioning is the removal of the OnSS. The change in surfacing and removal of attenuation storage associated with the OnSS could affect flood risk

Potential effect	Maximum adverse scenario assessed	Justification
		as it would take the natural environment a period of time to re-establish itself to provide natural attenuation.
OnSS Works affecting surface watercourses		The MDS for water quality of watercourses during decommissioning is the removal of the OnSS. The onshore export cable remaining in situ provides potential lateral pathways for water flow which could indirectly affect water quality.

24.5.3 Embedded Mitigation

24.5.1 Mitigation measures that were identified and adopted as part of the evolution of the project design (embedded into the project design) and that are relevant to onshore hydrology, hydrogeology and flood risk are listed in Table 24.19. General mitigation measures, which would apply to all parts of the project, are set out first. Thereafter, mitigation measures that would apply specifically to onshore hydrology, hydrogeology and flood risk issues associated with the landfall, onshore ECC and OnSS, are described separately.

24.5.2 The mitigation includes embedded measures such as design changes and applied mitigation which is subject to further study or approval of details; these include avoidance measures that will be informed by pre-construction surveys, and necessary additional consents where relevant. The composite of embedded and applied mitigation measures apply to all parts of the Project development works, including pre-construction, construction, operation and maintenance, and decommissioning.

Table 24.19: Embedded mitigation relating to onshore hydrology, hydrogeology and flood risk

Project phase	Mitigation measures embedded into the project design
General	
Project design	Careful routing of the onshore ECC and design of key crossing points (flood defence structures, Main Rivers, non-main and ordinary watercourses, IDB watercourses, roads, utilities, etc.), including the use of Trenchless techniques to avoid key areas of sensitivity.
Construction	
Code of Construction Practice	An outline CoCP is provided in document reference: 8.1 that sets out the principles to be followed when the CoCP is finalised and secured as a condition of the DCO. The CoCP will include measures to control the impacts of watercourse crossings and crossings beneath flood defences. The crossing points and crossing types have been specified to ensure that construction does not result in significant alteration to the existing hydrological regimes or an increase in fluvial or tidal flood risk.

Project phase	Mitigation measures embedded into the project design
Surface water drainage	Development of the OnSS will result in the construction of low permeability surfacing and buildings with impermeable roofing, increasing the volume and the rate of surface water runoff from the site. A surface water drainage scheme is required to ensure the runoff rates to the surrounding water environment are managed at rates agreed with the relevant regulatory authority. An Outline Surface Water Drainage Strategy (document reference: 8.1.5) has been provided as part of the Outline CoCP (document reference 8.1). An Outline Operational Drainage Management Plan (document reference 8.12) has also been provided for the operational phase of the OnSS.
	The detailed (post consent) design of the surface water drainage scheme would be based on a series of infiltration/ soakaway tests carried out on site and the maximum potential attenuation volumes that are outlined in the supporting Outline Operational Drainage Management Plan (document reference 8.12). The tests will be undertaken prior to construction and in accordance with the BRE Digest 365 Guidelines.
	Temporary management of surface water will be required along the onshore ECC and at the OnSS during construction. An Outline Surface Water Drainage Strategy (document reference: 8.1.5) has been provided as part of the Outline CoCP (document reference 8.1). A final surface water drainage scheme will be informed by detailed design and provided as part of the final CoCP for approval by local authorities prior to construction which forms a requirement of the DCO.
	Measures to mitigate against water pollution will also apply to the OnSS and will include measures as set out for the onshore ECC below to minimise the risk of water pollution.
Flood risk	Cable trenching and construction site access road widening across surface watercourses will require measures to ensure that the water quality and flow rates are unaffected either directly or indirectly. These measures will be secured as part of the CoCP.
	The onshore ECC and the construction site access roads will be designed to minimise land take and to avoid, where possible, impacts on existing drainage networks and features.
	Preparation of an Emergency Flood Response Plan setting out actions in the event of flooding or a flood warning during construction works will be prepared as part of the CoCP post-consent. This would include a procedure for securing sensitive equipment and/or relocating materials stored in bulk.
	The onshore temporary construction compounds (TCCs) and construction access and haul roads would comprise permeable gravel overlying a permeable geotextile membrane of an appropriate standard.
	Where the ECC crosses a main river or defence, this will be achieved by using existing bridges or (where necessary) installing a temporary bridge. For ordinary watercourses, crossing options of temporary culverting or bridging will be agreed with the relevant IDB.

Project phase	Mitigation measures embedded into the project design
	Where the onshore ECC crosses smaller watercourses and land drainage, measures would be discussed with the relevant stakeholders (e.g., construction access roads installed over pre-installed culverts where possible).
	Trenchless drilling crossing techniques will be used for all Environment Agency main rivers and IDB owned or maintained drains. For riparian watercourses, the methodology will be agreed with the relevant landowner and IDB.
	Cable entry and exit points within transition joint bays and cable junction bays will be sealed with an appropriate water proofing material to mitigate flood risk.
	The Project will commission a pre-construction land drainage survey and carry out pre-construction land drainage works to ensure existing land drainage flow is maintained.
	Surface water flowing into work areas and excavated trenches during the construction period will be pumped via settling tanks or ponds to remove sediment and potential contaminants, before being discharged into local ditches or drains via temporary interceptor drains. Where gradients on site are significant, cable trenches will include a hydraulic brake (bentonite or natural clay seals) to reduce flow rates along trenches and hence reduce local erosion.
	Any field drainage intercepted during the cable installation will either be reinstated following the installation of the cable, diverted to a secondary channel, or replaced by the post-construction drainage scheme through agreement with the appropriate stakeholders.
	Any stockpiles along the onshore ECC would be kept to minimum possible size with gaps to allow surface water runoff to pass through.
Pollution prevention	All construction work will be undertaken in accordance with the Outline CoCP (document reference 8.1) and more specifically the Outline PPEIRP (document reference 8.1.4).
	Areas at risk of spillage, such as vehicle maintenance areas and hazardous substance stores (including fuel, oils, and chemicals) will be bunded and carefully sited to minimise the risk of hazardous substances entering drainage systems or local watercourses. Additionally, the bunded areas will have impermeable bases to limit the potential for migration of contaminants into groundwater following any leakage/spillage. Bunds used to store fuel, oil etc. will have a 110% capacity.
	Any refuelling of machinery will be undertaken within designated areas where spillages can be easily contained.
	Machinery will be routinely checked to ensure it is in good working condition to reduce the risk of leaks.
	Any tanks and associated pipe work containing oils and fuels will be double skinned and be provided with intermediate leak detection equipment.
	A spill procedure will be documented, and spill kits kept in the vicinity of potentially hazardous materials storage areas.

Project phase	Mitigation measures embedded into the project design
	Disturbance to areas close to watercourses will be reduced to the minimum necessary for the work.
	Excavated material will be placed in such a way as to avoid any disturbance of areas close to the banks of watercourses and any to prevent spillage into water features.
	Use of sediment fences along watercourses when working in close proximity to prevent sediment being washed into watercourses.
	Covers will be used by lorries transporting materials to/ from site to prevent releases of dust/ sediment to watercourses or drains.
	If applicable, storage of stockpiled materials should be on an impermeable surface to prevent leaching of contaminants and covered when not in use to prevent materials being dispersed by wind or rainfall runoff.
	Any visual/ olfactory signs of contamination encountered during excavation should be reported and investigated.
	A briefing will be included within the site induction highlighting the importance of water quality, the location of watercourses and pollution prevention measures.
	Drainage works to be constructed to relevant statutory guidance and approved prior to the commencement of construction.
Best practice	All construction work will be undertaken in accordance with the CoCP. An outline version of the CoCP is provided in document reference: 8.1 that sets out the principles to be followed when the CoCP is finalised and secured as part of the DCO. The CoCP will detail good practice guidance including, but not limited to: ▪ Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors CIRIA (C532) (CIRIA 2001); ▪ CIRIA – SuDS Manual (C753) (CIRIA, 2015b); ▪ No discharge to Main River watercourses will occur without permission from Environment Agency (SuDS Manual); ▪ No discharge to IDB maintained watercourses will occur without permission from the relevant IDB; ▪ Wheel washers and dust suppression measures to be used as appropriate to prevent the migration of pollutants (SuDS Manual); ▪ Regular cleaning of roads of any construction waste and dirt to be carried out (SuDS Manual); and ▪ A construction method statement to be submitted for approval by the responsible authority (SuDS Manual).
Operation and Maintenance	
General	The OnSS would contain potential pollutants which could include cooling oils, lubricants, fuels, greases, etc. The design, maintenance and operation of the facility would follow good practice in line with the prevailing guidance and legislation with regard to measures such as the storage and management of potentially polluting substances, emergency spill response procedures, clean up and control of any potentially contaminated surface

Project phase	Mitigation measures embedded into the project design
	water runoff and routine inspection to prevent or contain leaks of any pollutants.
Decommissioning	
General	Decommissioning practices will incorporate measures similar to the construction phase, to prevent pollution and increased flood risk. These measures will include emergency spill response procedures, control of surface water and clean up and remediation of any contaminated soils. Exposed cables ducts will be sealed with an appropriate water proofing material to mitigate flood risk or creation of preferential flow pathways.
	A decommissioning plan will be required, to include protection of the water environment, based on guidance that will be appropriate at the time of decommissioning.

24.6 Assessment Methodology

435. The criteria for determining the significance of effects is a two-stage process that involves defining the sensitivity of the receptors and the magnitude of the impacts on those receptors. This section describes the criteria applied in this chapter to assign values to the sensitivity of receptors and the magnitude of potential impacts. Unless stated otherwise the terms used to define sensitivity and magnitude are based on those used in the Design Manual for Roads and Bridges (DMRB) methodology (DMBR 2009), which is described in more detail in Volume 1, Chapter 5: EIA Methodology (document reference 6.1.5).

24.6.1 Assessment Criteria and Assignment of Significance

436. This section describes the criteria applied in this chapter to assign values to the sensitivity of receptors and the magnitude of potential impacts.

437. The magnitude of the impact is defined in Table 24.20.

Table 24.20: Impact magnitude definitions

Magnitude	Description/reason
High	Long term or permanent loss of resource and/or quality and integrity of resource; likely to cause exceedance of statutory objectives and/or breaches of legislation; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major long-term improvement of attribute quality (Beneficial).
	Changes to land within the application boundary resulting in an increase in runoff with flood potential and also significant changes to erosion and sedimentation patterns (Adverse).
	Major changes to groundwater levels, flow regime and risk of groundwater flooding (Adverse)
Medium	Loss of resource, but not adversely affecting the overall integrity; partial loss of/damage to key characteristics, features or elements with/without exceedance of statutory objectives or with/without breaches of legislation (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
	Moderate changes to erosion and sedimentation patterns (Adverse).
	Moderate changes to groundwater levels, flow regime and risk of groundwater flooding (Adverse).
Low	Some measurable change in attributes, quality or vulnerability; reversible or minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
	Minor changes to erosion and sedimentation patterns (Adverse).
	Minor changes to groundwater levels, flow regime and risk of groundwater flooding (Adverse).
Negligible	Very minor or no loss or detrimental alteration to one or more characteristics, features or elements; impact of insufficient magnitude to affect the use/integrity (Adverse).
	Very minor or no benefit to or positive addition of one or more characteristics, features or elements; impact of insufficient magnitude to affect the use/integrity (Beneficial).
	No alteration or very minor changes with no impact to watercourses, hydrology, hydrodynamics, erosion and sedimentation patterns (Adverse).

438. The sensitivity/importance of the receptor is defined in Table 24.21 below. Whilst a sensitivity category of 'very high' is proposed as a potential category for sensitivity criteria within the DMRB methodology, for the purposes of the assessment of hydrology, hydrogeology and flood risk effects, the categories within the range of 'high' to 'negligible' are considered to appropriately cover the potential receptors. Where a receptor could be placed within more than one category of value, professional judgement has been applied to determine which category is appropriate.

Table 24.21: Sensitivity/importance of the environment

Receptor sensitivity/ importance	Description	Receptor
High	High importance and rarity, international level and limited potential for substitution	Watercourses or water bodies of good chemical status/ high ecological status and/or high-quality targets under the WFD. Watercourses or water bodies draining through environmentally designated areas of international importance. Watercourses or water bodies supporting highly sensitive abstractions. Watercourses, water bodies or floodplain with a designation for ecological/conservation value. Development classified as 'highly vulnerable' to flood risk (under NPPF). Narrow floodplain where a small increase in volume results in a relatively large increase in flood levels. Public potable water supply from either surface or groundwater source. Aquifer is a Principal Aquifer providing regionally important potable water supply and classified as SPZ.
Medium	Medium importance and rarity, district or regional level, limited potential for substitution	Watercourses or water bodies of good chemical status/ moderate to good ecological status and/or moderate to high quality targets under the WFD. Watercourses or water bodies draining through environmentally designated areas of national importance.

Receptor sensitivity/ importance	Description	Receptor
		Watercourses or water bodies supporting moderately sensitive abstractions. Development classified as 'more vulnerable' to flood risk (under NPPF). Private potable use or non-drinking water abstraction for agricultural use from either surface or groundwater source. Aquifer is a Principal or Secondary A Aquifer not designated as SPZ. Bathing water monitored waterbody
Low	Low importance and rarity, local or district level	Watercourses or water bodies with a chemical water quality status classed as fail or an ecological water quality status classed as poor and/or moderate quality targets under the WFD. Watercourses or water bodies of local importance. Watercourses or water bodies supporting abstractions of limited sensitivity. Receptors classified as 'less vulnerable' to flood risk (under NPPF). Wide floodplain where a large increase in volume results in a small increase in flood levels. Aquifer is a Secondary A or Secondary B Aquifer.
Negligible	Very low importance and rarity, local level	Watercourses or water bodies with a chemical water quality status classed as 'fail' and an ecological water quality status classed as poor and/or low-quality targets under the WFD. Watercourses or water bodies of limited local importance. Watercourses or water bodies supporting no recorded abstractions.

Receptor sensitivity/ importance	Description	Receptor
		Non-productive geology in terms of groundwater resource.

439. The significance of the effect upon hydrology, hydrogeology and flood risk is determined by correlating the potential magnitude of the impact and sensitivity of the receptor, as defined in the matrix presented at Table 24.22. This approach uses the term "beneficial" for an advantageous or positive effect on an environmental resource or receptor or "adverse", for a detrimental or negative effect on an environmental resource or receptor. Where a range of significance is presented in Table 24.22, the final assessment for each effect is based upon expert judgement.

440. Adverse effects of moderate and above are considered significant in EIA terms. All beneficial effects and adverse effects below moderate are not considered significant in EIA terms. The broad definitions of the terms used are set out in Chapter 5 (document reference 6.1.5).

Table 24.22: Matrix to determine effect significance

		Magnitude of impact			
		Negligible	*Low*	*Medium*	*High*
Sensitivity of receptor	*Negligible*	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Minor (Not significant)
	Low	Negligible (Not significant)	Minor (Not significant)	Minor (Not significant)	Moderate (Significant)
	Medium	Minor (Not significant)	Minor (Not significant)	Moderate (Significant)	Major (Significant)
	High	Minor (Not significant)	Moderate (Significant)	Major (Significant)	Major (Significant)

24.6.2 Assumptions and Limitations

441. The assessment is based on publicly available data obtained from the EA, Local Authorities, IDBs and commercial data supply companies, as well as additional information supplied from stakeholders during the scoping and consultation stages.

442. The assessment is limited by a lack of detailed information on:

- Flow data for all watercourses and drainage channels; and

- Water quality data for specific locations.

443. Overall, a moderate to high level of certainty has been applied to the study. Where available, catchment data regarding water quality has been used to inform the assessment, with a hydrological site walkover undertaken for the onshore ECC route, including all Main River and IDB watercourse crossings within the hydrology, hydrogeology and flood risk study area. The information accessible in order to complete the assessment is considered sufficient to establish the baseline within the Project onshore hydrology, hydrogeology and flood risk study area, therefore, there are no data limitations that would affect the conclusions of this assessment.

444. The key parameters for assessment identified in Table 24.18 have been selected as the MDS that would have the potential to result in the greatest effect on an identified receptor or receptor group. This scenario has been selected from the details provided in Chapter 3 (document reference 6.1.3). Effects of greater significance are not predicted to arise should any other development scenario to that assessed here be taken forward in the final design scheme, within the assessed boundaries.

24.7 Impact Assessment

24.7.1 Construction

445. This section presents the assessment of impacts arising from the construction phase of the Project.

446. The impacts of the onshore construction of the Project have been assessed on hydrology, hydrogeology and flood risk in the onshore study area. The impacts are assessment against the MDS in Table 24.18.

447. A description of the potential effect on hydrology, hydrogeology and flood risk receptors caused by each identified impact is given below. In general, however, the environmental effects arising from the construction of the project are temporary, as they only occur during the construction phase.

448. The onshore ECC and 400kV cables FRA (document reference: 6.3.24.2) and the OnSS FRA (document reference: 6.3.24.3) each assesses the effects of flood risk on the temporary work areas associated with the construction phase and demonstrate how the significance of these effects can be reduced through best practice and mitigation measures.

24.7.1.1 Onshore ECC Installation

Impact 1: Water Quality

449. Several sections of the onshore ECC involve or require crossing a Main River, ordinary watercourses or drainage ditches, as shown in Volume 2, Figure 24.4 and listed in the Onshore Crossing Schedule ((document reference 6.3.3.3). Along the ECC, the cable passes through land, which is within tidal and fluvial floodplain, some of which is afforded protection by the coastal sea wall defences and defences along the course of the rivers.

450. Landfall trenchless drilling (or other trenchless crossing technique) exit pits will be located within the subtidal zone or the shallow subtidal zone. Principles for bentonite breakout

management have been considered within the Outline PPEIRP (document reference 8.1.4) provided as part of the CoCP (document reference 8.1).

451. The outline CoCP (document reference 8.1) identifies that contractors will require an Emergency Flood Response Plan (or similar) to ensure that procedures are in place in the event of a flood warning or the onset of flooding during the construction phase. Through measures such as the ceasing of works, relocation or securing of sensitive equipment and/ or materials and evacuation of workforce personnel, the CoCP will reduce the likelihood of construction activities resulting in incidents detrimental to water quality occurring in the event of flooding and reduce the magnitude of the impact of any such incidents.

452. The Outline CoCP (document reference 8.1) will also include measures to control runoff from the construction works. This could include, for example, sediment fences when working in proximity to open watercourses, containment of storage areas and treatment of any runoff from work areas or water from dewatering of trenches. Such measures would prevent the potential reduction in water quality associated with increased sediment loading affecting nearby tidal waters, fluvial watercourses or drainage ditches during onshore ECC construction works, especially during excavations or earthwork activities.

453. Stockpiling of materials during earthworks would be temporary and would only be permitted in designated areas. All designated stockpile areas would be a minimum of 10m from any open watercourse features. The potential for contaminants contained within the stockpiled materials to be leached into water bodies, resulting in a reduction in the quality of the receiving waters, would be reduced through the implementation of embedded mitigation, detailed in Table 24.19 and mitigation measures proposed within the CoCP, including secondary containment of bulk storage areas.

454. The embedded mitigation measures detailed in Table 24.19 include the implementation of spill procedures and use of spill kits. These measures together with appropriate drainage systems and containment will minimise the potential for any reduction in water quality associated with spills or leaks of stored oils/fuels/chemicals or other polluting substances migrating into nearby water bodies.

455. The potential presence of ground contamination and resulting effects on the quality of water receptors is considered in Chapter 23 (document reference 6.1.23).

Impact on watercourses

456. For watercourses, it is predicted that the impact on water quality from the ECC construction works would be direct and of an intermittent nature and of short duration.

457. The sensitivity of watercourse receptors ranges from **negligible to medium** and the magnitude of impact with the controls in place is deemed to be **low** given the embedded mitigation in place and that any direct pollution from spills would be small. The significance of effect is therefore considered to be **minor (adverse) or negligible**, which is not significant with regards to the EIA Regulations.

Impact on near-shore coastal waters and transitional water bodies

458. For the near shore coastal water body and the Witham and Welland transitional water bodies, the impact on water quality from the ECC construction works would be direct (shore works only) or indirect (via onshore watercourses discharging to the coast) and of an intermittent nature and short duration.

459. The mechanism for water quality impacts on the near shore coastal water body from inland works will be via watercourses, which will serve to reduce impacts from sediment entrainment and spills through settlement and dilution respectively.

460. The sensitivity of the near shore water body is **high** and the transitional water bodies are **low**. Potential for water quality impacts from works at the shore is negligible as any excavations will only have potential to mobilise sands and any direct pollution from spills will be very small relative to the receiving environment.

461. The magnitude of impact with controls in place is assessed to be **negligible**. The significance of effect on near shore coastal water is therefore considered to be **minor (adverse)** and the significance of effect on transitional water bodies is considered to be **negligible**, which are not significant with regards the EIA Regulations.

Impact on groundwater quality

462. As confirmed in Chapter 23 (document reference 6.1.23), there are no known point sources of contamination within the study area, however, on a precautionary basis, there is the potential for limited contamination to exist as a result of previous land uses, including agriculture and the use of nitrogen-based fertilisers. Any contamination is likely to be localised in its extent given the sources of contaminants and the characteristics of the underlying geology.

463. For groundwater, the impact on water quality would be direct and of an intermittent nature and of short duration. The sensitivity of the receptors is **high to negligible**, reflecting the range of different aquifer types along the onshore ECC. The magnitude of potential impact is deemed to be **negligible** given the embedded mitigation in place and that any direct pollution from spills would be small. The significance of effect is therefore considered to be **minor (adverse) or negligible**, which is not significant with regards the EIA Regulations.

464. A separate Groundwater Risk Assessment has been undertaken as document ref: 6.3.24.1.

Impact 2: Flood Risk

465. Spills of bulk materials such as concrete or entrainment of stockpiled material from excavations during cabling works could result in watercourses or drainage ditches becoming restricted or blocked. This could impact flow regimes and could result in an increase in fluvial flood risk.

466. Implementation of the embedded mitigation measures discussed at Section 24.5 and further measures which will be proposed within the CoCP, would reduce the likelihood of construction activities resulting in spillage incidents occurring and will ensure that there is very limited chance of stockpiled material becoming entrained and entering watercourses. This

would reduce the magnitude of impact of any such incident.

467. Large stockpiles of excavated/ construction materials, including the noise bund at the TJB, could block overland flow of surface water during heavy rainfall events and result in changes to existing surface water hydrology and an increase in surface water flood risk.

468. The laying of temporary surfacing material for the working area (which includes the corridor in which the access road, cable trench, excavated material and equipment are located) could result in a reduction in the permeability of the ground and therefore an increase in surface water flood risk.

469. These effects would be mitigated through the appropriate siting of stockpiles, provision of gaps to allow passage of surface water and development of a surface water drainage strategy for each phase of work along the ECC. Therefore, the effects of construction on surface water flood risk would be largely mitigated through the measures proposed within the CoCP.

470. The onshore ECC crosses main rivers, ordinary watercourses and drainage ditches. At any watercourse crossing there will be potential for the construction works associated with the crossing to increase fluvial flood risk through altering existing hydrological regime.

471. Construction activities would be undertaken in accordance with the final Construction Method Statement (CMS) which would be specified to ensure that construction does not result in an increase in flood risk. The CMS would specify mitigation measures including emergency and contingency plans for flooding incidents which may affect the works. The CMS would specify the need for a minimum cover depth between the cable and hard bed level of the watercourse being crossed.

472. In accordance with Environmental Permitting (England and Wales) Regulations 2016, consent would be sought from the Environment Agency to undertake works crossing, or within 8m of Main Rivers (including flood defences) or within 16m if it is a tidal main river. Ordinary watercourse consent will be required from the LLFA and/or the relevant IDB for works crossing any other watercourse. Construction activities would be undertaken in accordance with the conditions of any consent which would be specified to ensure that construction does not result in an increase in flood risk. The consent would specify mitigation measures including emergency and contingency plans for flooding incidents which may affect the works. The consent would specify the need for a minimum cover depth between the cable and hard bed level of the watercourse being crossed.

473. Overall, it is predicted that the impact on flood risk from construction of the onshore ECC (including crossing of watercourses) would be direct and of an intermittent nature and of short duration.

474. The sensitivity of the receptor (the fluvial and tidal floodplain) is considered to be **low**, and the magnitude of impact is deemed to be **negligible**. The significance of effect would, therefore, be **negligible**, which is not significant with regards the EIA Regulations.

24.7.1.2 Onshore Substation Construction

Impact 3: Water Quality

475. As set out for the onshore ECC works above, implementation of the embedded mitigation measures detailed in Table 24.19 and the measures proposed within the CoCP would reduce the likelihood of construction activities resulting in incidents detrimental to water quality occurring and reduce the magnitude of the impact of any such incidents.

Impact on watercourses

476. The proposed measures would include controls to prevent the potential reduction in water quality associated with increased sediment loading (including potentially contaminated sediment) entering nearby fluvial watercourses or drainage ditches during construction works, especially during excavating works. These measures are outlined within the Outline PPEIRP (document reference 8.1.4) included as part of the Outline CoCP (document reference: 8.1).

477. Materials excavated during construction works would be stockpiled temporarily in designated areas. All designated stockpile areas would be a minimum of 10m from any open watercourse features. The potential for contaminants contained within the stockpiled materials to be leached into nearby fluvial watercourses or drainage ditches is not considered likely as contaminated land from pre-existing ground conditions has been effectively ruled out of assessment in Chapter 23 (document reference 6.1.23), as no contamination sources have been identified along the onshore ECC or at the OnSS. Where practical, where soil is to be stored for over six months it will be covered to minimise erosion, seeded or allowed to re-vegetate naturally.

478. The embedded mitigation measures detailed in Table 24.19 include the implementation of spill procedures and use of spill kits on site. This will reduce the risk of any potential degradation in water quality associated with spills or leaks of stored oils, fuels, or chemicals used during the construction works migrating into nearby watercourses or drainage ditches.

479. The potential presence of ground contamination and resulting effects on the quality of water receptors is considered in Chapter 23 (document reference 6.1.23).

480. Overall, it is predicted that the impact on water quality would be direct and of an intermittent nature and of short duration. The sensitivity of the receptors (receiving watercourses within the vicinity of the OnSS) is **negligible** to **medium** and the magnitude of impact is deemed to be **low**. The significance of effect would, therefore, be **minor (adverse) or negligible**, which is not significant in EIA terms.

Impact on groundwater quality

481. For groundwater, the impact on water quality would be direct and of an intermittent nature and of short duration. The sensitivity of the receptors is **high to negligible,** and the magnitude of impact is deemed to be **negligible (adverse)** given the embedded mitigation in place and that any direct pollution from spills would be small. The significance of effect is therefore considered to be **minor (adverse) or negligible**, which are not significant with regards the EIA Regulations.

Impact 4: Flood Risk

482. Spills of bulk materials such as concrete or entrainment of stockpiled material from excavations during OnSS construction could result in watercourses or drainage ditches becoming restricted or blocked. This could impact flow regimes and could result in an increase in localised fluvial flood risk.

483. Implementation of the embedded mitigation measures detailed within Table 24.19 and further measures which will be proposed within the CoCP, would reduce the likelihood of construction activities resulting in spillage incidents occurring and will ensure that there is very limited chance of stockpiled material becoming entrained to potentially enter watercourses. This would reduce the magnitude of impact of any such incidents.

484. Large stockpiles of excavated/ construction materials could block overland flow of surface water during heavy rainfall events and result in changes to existing surface water hydrology and an increase in surface water flood risk.

485. The laying of temporary surfacing material for access roads, TCC areas or any designated stockpile areas could result in a reduction in the permeability of the ground and therefore an increase in surface water flood risk.

486. These effects would be mitigated through the appropriate siting of stockpiles, provision of gaps to allow passage of surface water and development of a drainage strategy. Therefore, the effects of construction on surface water flood risk would be largely mitigated through the measures proposed within the CoCP.

487. The OnSS construction areas (including land for access road options) may disturb existing surface water drainage features (ordinary watercourses) which may require diversion. Ordinary watercourse consent will be required from the LLFA or relevant IDB for works to alter any watercourse affected by the OnSS construction. Any diversion or alteration to existing watercourse features would be undertaken in accordance with the conditions of the consent which would be specified to ensure that works do not result in an increase in flood risk. The consent would specify mitigation measures including emergency and contingency plans for flooding incidents which may affect the works.

488. The OnSS area is within an area that is protected by existing defences that are maintained by the Environment Agency. However, should a breach or overtopping event occur there is a residual risk of flooding from the tidal reach of the River Welland, which has been modelled in the River Welland Breach Modelling Report, Annex to Appendix 24.3 (document reference 6.3.24.3). The activities carried out during construction phase would not impede floodplain flows arising from a tidal or fluvial flood event or reduce floodplain storage. A separate FRA for the OnSS has been undertaken (document reference: 6.3.24.3).

489. Overall, it is predicted that the impact on flood risk would be direct and of an intermittent nature and of long duration. The sensitivity of the receptor (the fluvial/tidal floodplain) is considered to be **low**, and the magnitude of impact is deemed to be **medium**. The significance of effect would, therefore, be **minor (adverse)**, which is not significant with regards the EIA Regulations.

490. TCC area(s) would be used during construction of the OnSS. This would be in addition to the land required for the substation and would be used to store plant and equipment whilst construction is being undertaken.

491. Overall, it is predicted that the impact on flood risk from the TCC areas would be direct and of an intermittent nature and of short duration. The sensitivity of the receptor (the fluvial floodplain) is considered to be **low**, and the magnitude of impact is deemed to be **negligible**. The significance of effect would therefore be **negligible**, which is not significant with regards the EIA Regulations.

24.7.1.3 Trenchless Drilling Works

Impact 5: Water Quality

492. As set out for the onshore ECC works above, implementation of the embedded mitigation measures detailed in Table 24.19 and the measures proposed within the CoCP would ensure that the potential for incidents detrimental to water quality occurring is minimised and would reduce the magnitude of the impact of any such incidents.

493. The CoCP identifies that contractors will require an Emergency Flood Response Plan (or similar) to ensure that procedures are in place in the event of flooding during any trenchless drilling (or other trenchless crossing technique) activity. In the event of a flood warning being received for an area where trenchless construction works are taking pace, any activity would be stopped and where possible, all sensitive equipment or plant would be relocated from the risk area and material secured. Workforce personnel would be evacuated from the work area until any such warning was over. These measures will reduce the likelihood of construction activities resulting in incidents detrimental to water quality occurring in the event of flooding and reduce the magnitude of the impact of any such incidents.

494. Materials excavated during initial excavations or during trenchless crossing works would be stockpiled temporarily in designated areas. All designated stockpile areas would be a minimum of 10m from any open watercourse features where practicable. The potential for contaminants contained within the stockpiled materials to be leached into nearby fluvial watercourses or drainage ditches is not considered likely as contaminated land from pre-existing ground conditions has been effectively ruled out of assessment in Chapter 23 (document reference 6.1.23) as no contamination sources have been identified along the onshore ECC. If required and where practical, where soil is to be stored for over six-months it will be covered to minimise erosion or allowed to re-vegetate naturally.

495. The potential presence of ground contamination and resulting effects on the quality of water receptors is considered in Chapter 23 (document reference 6.1.23).

496. The proposed measures would include controls to prevent the potential reduction in water quality associated with increased sediment loading (including potentially contaminated sediment) and with spills or leaks of oils, fuels or chemicals used during the trenchless crossing works migrating into nearby fluvial or tidal watercourses or drainage ditches during construction works, especially during excavation earthworks and management of spoil from drilling. Depending on the final methodology and location, it may be necessary to install

temporary sheet piled exit pits to prevent water intrusion to provide a dry working area and to retain drilling fluid (bentonite). Principles for bentonite outbreak management have been provided as part of the Outline PPEIRP (document reference 8.1.4) provided as part of the Outline CoCP (document reference: 8.1).

Impact on near-shore coastal water

497. For the near shore coastal water body, and the Witham and Welland transitional water bodies, the impact on water quality from the trenchless crossing works would be direct (shore works only) or indirect (via onshore watercourses discharging to the coast) and of an intermittent nature and of short duration. The sensitivity of the near shore water body is **high** and the transitional water bodies are **low**. Potential for water quality impacts from shore works is **negligible** as the cable installation will be trenchless and any excavations is likely to only have potential to mobilise sands and any direct pollution from spills will be very small relative to the receiving environment.

498. The mechanism for water quality impacts on the near shore coastal water body from inland trenchless crossing activity will be via watercourses, which will serve to reduce impacts from sediment entrainment and spills through settlement and dilution respectively. The magnitude of impact with controls in place is assessed to be **negligible**. The significance of effect on near shore coastal water is therefore considered to be **minor (adverse)** and the significance of effect on transitional water bodies is considered to be **negligible**, which are **not significant** with regards the EIA Regulations.

Impact on watercourses

499. For inland watercourses the impact on water quality from the trenchless crossing works would be direct and of an intermittent nature and of short duration.

500. The sensitivity of the receptors range from **negligible to medium** and the magnitude of impact is deemed to be **low**. The significance of effect on inland watercourses would, therefore, be **minor (adverse) or negligible**, which is **not significant** with regards the EIA Regulations.

Impact on groundwater

501. The impact on groundwater quality would be direct and of an intermittent nature and of short duration. The sensitivity of the receptors is **high to negligible**, reflecting the range of different aquifer types along the onshore ECC. The magnitude of potential impact is deemed to be **negligible** given the embedded mitigation in place and that any direct pollution from spills would be small. The significance of effect is therefore considered to be **minor (adverse) to negligible,** which is **not significant** with regards the EIA Regulations.

Impact 6: Flood Risk

502. Spills of bulk materials such as concrete or entrainment of stockpiled material from excavations or spoil from drilling during trenchless crossing works could result in watercourses or drainage ditches becoming restricted or blocked. This could impact flow regimes and could result in an increase in fluvial flood risk.

503. Implementation of the embedded mitigation measures discussed at Section 24.5 and

further measures which will be proposed within the CoCP, would reduce the likelihood of construction activities resulting in spillage incidents occurring and will ensure that there is very limited chance of stockpiled material becoming entrained and entering watercourses. This would reduce the magnitude of impact of any such incident.

504. Large stockpiles of excavated/ construction materials could block overland flow of surface water during heavy rainfall events and result in changes to existing surface water hydrology and an increase in surface water flood risk.

505. The laying of temporary surfacing material for the trenchless crossing working areas could result in a reduction in the permeability of the ground and therefore an increase in surface water flood risk.

506. These effects would be mitigated through the appropriate siting of stockpiles, provision of gaps to allow passage of surface water and development of a drainage strategy. Therefore, the effects of construction on surface water flood risk would be largely mitigated through the measures proposed within the CoCP.

507. The proposed trenchless crossing works will be used to cross existing flood defences and a number of Main River channels along the ECC. At any watercourse crossing there will be potential for the drilling and construction activity associated with trenchless crossing works to increase fluvial flood risk through altering the existing hydrological regime.

508. In accordance with Environmental Permitting (England and Wales) Regulations 2016, or the DCO Protective Provisions, consent or approval would be sought from the Environment Agency to undertake works crossing, or within 8m of flood defences or main rivers or within 16m if it is a tidal main river. Trenchless drilling activities would be undertaken in accordance with the conditions of any consent granted or methodology approved which would be specified to ensure that construction does not result in an increase in flood risk. The consent would specify mitigation measures including emergency and contingency plans for flooding incidents which may affect the works. The consent would specify the need for a minimum cover depth between the cable and hard bed level of the watercourse being crossed.

509. Overall, it is predicted that the impact on tidal and fluvial flood risk from trenchless drilling crossings would be direct and of an intermittent nature and of short duration.

510. The sensitivity of the receptor (the fluvial and tidal floodplain) is considered to be **low**, and the magnitude of impact is deemed to be **negligible**. The significance of effect would therefore be **negligible**, which is **not significant** with regards the EIA Regulations.

511. The trenchless crossing cable installation compounds would be used during the construction phase, which would be used to store plant and equipment whilst works are being undertaken. There is potential for these compounds to be located within the fluvial or tidal floodplain. Further assessment of flood risk for these areas are covered in the onshore ECC and 400kV cables FRA (document reference: 6.3.24.2).

512. The FRA has identified appropriate mitigation measures to ensure that the flood risk associated with the TCCs is minimised to an acceptable level, including a requirement for the contractor to prepare an Emergency Flood Response Plan as part of the CoCP, incorporating

triggers from the EA's flood warning service in the event of a potential flood threat to the area in which the compound is located.

513. Overall, it is predicted that the impact on flood risk associated with trenchless crossing TCCs would be direct and of an intermittent nature and of short duration. The sensitivity of the receptor (fluvial and tidal floodplain) is considered to be **low**, and the magnitude of impact is deemed to be **negligible**. The significance of effect would therefore be **negligible**, which is **not significant** with regards the EIA Regulations.

24.7.1.4 Landfall Installation

Impact 7: Water Quality

514. As set out for the onshore ECC works above, implementation of the embedded mitigation measures detailed in Table 24.19 and the measures proposed within the CoCP would reduce the likelihood of construction activities resulting in incidents detrimental to tidal water quality occurring and reduce the magnitude of the impact of any such incidents. Potential impacts to water quality associated with the 'offshore' construction works, from MWHS to the array, will be mitigated through the application of a Project Environmental Management Plan which will be secured in the Marine Licence(s).

515. The proposed measures would include controls to prevent the potential reduction in water quality associated with increased sediment loading (including potentially contaminated sediment) entering nearby tidal waters during excavation works or trenchless crossing activities.

516. Stockpiling of materials during earthworks would be temporary and would only be permitted in designated areas. The potential for contaminants contained within the stockpiled materials or associated with spills or leaks of stored oils, fuels or chemicals becoming mobilised into tidal waters, would be reduced through the implementation of embedded mitigation, detailed in Table 24.19 and mitigation measures proposed within the CoCP.

517. Should a tidal flood event associated with extreme sea levels occur whilst construction works are in progress, there is the potential for stored materials (e.g., stockpiled soils and excavated material) to be mobilised by the floodwaters and washed into coastal waters, potentially resulting in a reduction in local tidal water quality.

518. The CoCP will include measures such as an Emergency Flood Response Plan to ensure that procedures are in place in the event of flooding during the construction phase. Through measures such as the ceasing of works, relocation or securing of materials and evacuation of workforce personnel the CoCP will reduce the likelihood of construction activities resulting in incidents detrimental to water quality occurring in the event of flooding and reduce the magnitude of the impact of any such incidents.

519. The potential volume and concentration of any contaminated water entering tidal waters as a result of construction activities is considered to be low compared to that of the receiving tidal waters. The embedded mitigation measures detailed in Table 24.19 includes the implementation of spill procedures and use of spill kits. These measures will minimise the potential for any reduction in water quality associated with spills or leaks migrating into tidal waters.

520. No potential sources of contamination have been identified from former land uses at landfall and therefore, the probability of mobilising existing contaminants in the vicinity is considered unlikely. The onshore cable would be installed by trenchless drilling (or other trenchless crossing technique) under the sea defences and the coastal sand dunes. A TCC compound would be established at the trenchless crossing TJB working area, with another TCC located near the exit pit works within the beach area, which are likely to incorporate a storage area for fuels and chemicals. As a result, there is the potential for contaminants to be released as a result of accidental spillage or inappropriate storage and therefore, potentially affect the underlying groundwater.

Impact on near-shore coastal water

521. For the near-shore tidal waters, the impact on water quality from the landfall works would be direct and of an intermittent nature and of short duration.

522. The sensitivity of the near shore water body is **high**. Potential for water quality impacts from shore works is **negligible** as any excavations are likely to only have potential to mobilise sands and any direct pollution from spills will be very small relative to the receiving environment. The magnitude of impact with controls in place is assessed to be **negligible**. The significance of effect on near shore coastal water is therefore considered to be **low (adverse)**, which is **not significant** with regards the EIA Regulations.

Impact on watercourses

523. At any watercourse crossing there will be potential for the drilling and construction activity associated with trenchless crossing works to impact water quality. For inland watercourses along the onshore ECC the impact on water quality from the landfall trenchless crossing works would be direct and of an intermittent nature and of short duration.

524. The sensitivity of the watercourse receptors close to landfall range from **negligible to medium** and the magnitude of impact is deemed to be **low**. The significance of effect on watercourses would, therefore, be **minor (adverse) or negligible**, which is **not significant** in EIA terms.

Impact on groundwater

525. For the landfall trenchless crossing, the underlying bedrock geology is of **high** sensitivity, however the quality of the groundwater is likely to be affected with elevated levels of salinity, which may reduce its importance/ sensitivity. The implementation the CoCP would control the storage and use of fuels and chemicals within the TCCs and therefore reduce the likelihood of contamination occurring. Any risk of increased salinity to groundwater will be localised and small.

526. The impact on groundwater quality would be direct and of an intermittent nature and of short duration. The sensitivity of the groundwater receptor is **high**, and the magnitude of impact is deemed to be **negligible** given the embedded mitigation in place and that any direct pollution from spills would be small. The significance of effect is therefore considered to be **minor (adverse)** which is **not significant** with regards the EIA Regulations.

Impact 8: Flood Risk

527. The laying of temporary surfacing material for the landfall access road, compound and any designated stockpile area could result in a reduction in the permeability of the ground and therefore an increase in surface water flood risk. The increase in surface water runoff volume arising on the impermeable areas is likely to be relatively minor and would discharge directly to tidal waters.

528. Overall, it is predicted that the impact on surface water flood risk would be direct and of an intermittent nature and of short duration.

529. The sensitivity of the receptor (the fluvial and tidal floodplain) is considered to be **low,** and the magnitude of impact is deemed to be **negligible**. The significance of effect would therefore be **negligible**, which is **not significant** with regards the EIA Regulations.

530. Export cables will be installed by trenchless techniques passing beneath flood defences located along the coast. The potential impact from impairment of the coastal defence structure would result in an increase in tidal flood risk.

531. In accordance with Environmental Permitting (England and Wales) Regulations 2016, the Project will seek a permit exemption from the Environment Agency for trenchless works passing beneath the defences. If necessary, the necessary protective provisions will be agreed with the Environment Agency to allow them to approve the design and construction management plan of works affecting flood defences.

532. Overall, it is predicted that the impact on tidal flood risk would be direct and of an intermittent nature and of short duration.

533. The sensitivity of the receptor (the fluvial and tidal floodplain) is considered to be **low**, and the magnitude of impact is deemed to be **negligible**. The significance of effect would therefore be **negligible**, which is **not significant** with regards the EIA Regulations.

24.7.1.5 Operations and Maintenance

534. The impacts of the operation and maintenance of the Project have been assessed on hydrology, hydrogeology and flood risk in the onshore study area. The impacts arising from the operation of the project are detailed in Section 24.5 above, along which the MDS (Table 24.18) against which each operational phase impact has been assessed.

535. A description of the potential effect on hydrology, hydrogeology and flood risk receptors caused by each identified impact is given below.

536. The OnSS FRA (document reference: 6.3.24.3) will assess the effects of flood risk on the permanent infrastructure associated with the operational phase and demonstrate how the significance of these effects can be reduced through mitigation measures.

537. An Outline Operational Drainage Management Plan (document reference 8.12) which details how surface water risk will be managed during the operational phase of the OnSS is included in the application documents

24.7.1.6 Permanent Onshore ECC Infrastructure

Impact 9: Flood Risk and Water Quality

538. The onshore cable would be buried underground. Restoration of land above the cable would be included in the construction phase, ensuring that the former land use is generally retained. There would be some minor increase in impermeable surfacing associated with the onshore ECC, arising from manholes at ground level for access to link boxes. There is a potential increase in surface water flood risk from these areas due to the greater volume and rate of runoff arising from reduced infiltration potential to ground.

539. Appropriate surface water drainage measures would be implemented to mitigate against this potential risk by ensuring that runoff from the access routes is restricted to acceptable rates (to be agreed with the LLFA) or passes to tidal waters, thereby not increasing surface water flood risk. Infiltration-based SUDS techniques would be considered where feasible to achieve this.

Impact on environmental receptors

540. Overall, it is predicted that the impact from the onshore ECC on flood risk and water quality would be direct and of a continuous nature and medium to long duration.

541. The sensitivity of the receptors (watercourses, near-shore coastal waters and floodplain) ranges from **negligible** to **medium** and the magnitude of impact is deemed to be **negligible**. The significance of effect would therefore be **minor (adverse) or negligible**, which is **not significant** with regards the EIA Regulations.

24.7.1.7 Onshore Substation

Impact 10: Flood Risk and Water Quality

542. The development of the OnSS and permanent access route would result in an increase in impermeable surfacing. The majority of the compound would remain permeable. Through the introduction of impermeable surfacing associated with the substation building and access track, there is a potential increase in surface water flood risk due to the greater volume and rate of runoff arising from reduced infiltration potential to ground.

543. An Outline Operational Drainage Management Plan has been provided as document reference: 8.12 to mitigate against this potential risk. Surface water drainage measures would be implemented to ensure that runoff from the site is managed and restricted to rates agreed with relevant IDB, thereby not increasing surface water flood risk. A range of feasible SUDS techniques could be used to achieve this, e.g. infiltration features or surface water detention areas.

Impact on flood risk

544. Overall, it is predicted that the impact on surface water flood risk would be direct and of a continuous nature and of medium to long duration.

545. The sensitivity of the receptors (watercourses and the floodplain) ranges from **negligible to medium** and the magnitude of impact is deemed to be **negligible**. The significance of effect

would, therefore, be **minor (adverse) or negligible**, which is **not significant** with regards the EIA Regulations.

546. The OnSS is located within Flood Zone 3. There could be an effect on the fluvial or tidal floodplain associated with the substation during the operational phase. The effect of these works on flood risk have been assessed in more detail in the OnSS FRA (document reference: 6.3.24.3).

547. Overall, it is predicted that the impact on flood risk to the site would be direct and of a continuous nature and of medium to long duration.

548. The sensitivity of the receptor (the floodplain) is considered to be **low,** and the magnitude of impact is deemed to be **negligible**. The significance of effect would therefore be **negligible**, which is **not significant** with regards the EIA Regulations.

24.7.1.8 Trenchless Crossings

Impact 11: Flood Risk and Water Quality

549. The trenchless crossing drilling for the onshore ECC would require working areas at either side of each trenchless drilling crossing. Following construction, these areas would be restored, with the former land use retained. The only permanent features on the surface of the onshore ECC would be the link box inspection chambers, which would be buried with ground level manhole type covers. Therefore, the only risk in terms of flooding and water quality would be any access routes required for inspection and maintenance of the link boxes.

550. Adequate surface water drainage measures would be implemented to mitigate against this potential risk by ensuring that runoff from the access routes is restricted to acceptable rates (to be agreed with the LLFA) or passes to tidal waters, thereby not increasing surface water flood risk. A range of feasible SUDS techniques could be used to achieve this, e.g., infiltration features or surface water detention areas.

Impact on waterbodies and floodplain

551. Overall, it is predicted that the impact on flood risk and water quality would be direct and of a continuous nature and of medium to long duration.

552. The sensitivity of the receptors (watercourses, near-shore coastal waters and floodplain) ranges from **negligible to medium** and the magnitude of impact is deemed to be **negligible**. The significance of effect would therefore be **minor (adverse) or negligible**, which is **not significant** with regards the EIA Regulations.

24.7.1.9 Permanent Landfall Site Infrastructure

Impact 12: Flood Risk and Water Quality

553. The landfall site would include TJBs and a temporary working area. Following construction, the temporary working area would be restored to its former land. The covers above each TJB chamber will either be buried or set flush with the surrounding ground level. The TJB will be

located a minimum of 80m west of Roman Bank. The only risk in terms of flooding and water quality would be any access routes required for inspection and maintenance of these features.

554. Adequate surface water drainage measures would be implemented to mitigate against this potential risk by ensuring that runoff from the access routes is restricted to acceptable rates (to be agreed with the LLFA) or passes to tidal waters, thereby not increasing surface water flood risk. A range of feasible SUDS techniques could be used to achieve this, e.g., infiltration features or surface water detention areas.

Impact on waterbodies and floodplain

555. Overall, it is predicted that the impact on flood risk and water quality would be direct and of a continuous nature and of medium to long duration.

556. The sensitivity of the receptors (watercourses, near-shore coastal waters and floodplain) ranges from **negligible to medium** and the magnitude of impact is deemed to be **negligible**. The significance of effect would therefore be **minor (adverse) or negligible**, which is **not significant** with regards the EIA Regulations.

24.7.2 Decommissioning

557. The impacts of the decommissioning of the Project have been assessed on hydrology, hydrogeology and flood risk in the onshore study area. The impacts arising from the decommissioning of the project are detailed in Section 24.5 above, along which the MDS (Table 24.18) against which each decommissioning phase impact has been assessed.

558. During decommissioning phase, the impacts on hydrology, hydrogeology and flood risk will be similar to those assessed for the construction phase. Good practice measures (similar to those identified within the CoCP) would be employed during decommissioning and would be agreed with statutory authorities at the time of decommissioning through a decommissioning plan.

559. The significance of effects associated with the temporary impacts on water quality and flood risk would be **minor (adverse) or negligible**, as assessed in the construction phase detailed above, which is **not significant** with regards the EIA Regulations.

560. Post-decommissioning, the long-term effects of the decommissioned project are described below.

24.7.2.1 Decommissioning of the Onshore ECC

Impact 13: Flood Risk and Water Quality

561. With respect to the buried onshore cables, these would be left in place during decommissioning. Allowing the cables to remain in place is considered an acceptable option with minimal environmental impact. TJBs and link boxes may be removed, depending on agreements reached with the landowners and regulatory authorities in place at the time. Removal of TJB or link box structures would return the site to its pre-development state. The

maximum adverse scenario in terms of flood risk is therefore for the jointing bays to remain in place.

Impact on all environmental receptors

562. Overall, it is predicted that the impact of the decommissioned ECC on flood risk and water quality in the maximum adverse scenario (i.e., jointing bays left in situ) would be direct and of a continuous nature and of medium to long duration.

563. The sensitivity of the receptors (watercourses, near-shore coastal waters, groundwater and floodplain) ranges from **negligible to high** and the magnitude of impact is deemed to be **negligible**. The significance of effect would, therefore, be **minor (adverse) or negligible**, which is **not significant** with regards the EIA Regulations.

24.7.2.2 Decommissioning of the Onshore Substation

Impact 14: Flood Risk and Water Quality

564. It is anticipated that the OnSS would be gradually dismantled on site with certain infrastructure removed for recycling or reuse. Following this, the area is likely to be remediated and restored.

565. The decommissioning works may involve removal of some or all of the impermeable hard-standing surfacing and restoration of the permeable greenfield land present prior to construction. This action would result in the surface water flood risk being returned to its pre-development state. Specific decommissioning requirements and potential concerns with regards to hydrology, hydrogeology and flood risk would be discussed with the relevant statutory consultees at the time.

Impact on all environmental receptors

566. Overall, it is predicted that the impact of the decommissioned OnSS on flood risk and water quality would be direct and of a continuous nature and of long duration.

567. The sensitivity of the receptors (watercourses, groundwater and the fluvial and tidal floodplain) is considered to range from **negligible to high** and the magnitude of impact is deemed to be **negligible**. The significance of effect would therefore be **minor (adverse) or negligible**, which is **not significant** with regards the EIA Regulations.

24.8 Cumulative Effects Assessment

568. This cumulative impact assessment for hydrology, hydrogeology and flood risk has been undertaken in accordance with the methodology provided in Volume 3, Appendix 5.3: Onshore Cumulative Effects Assessment Approach (document reference 6.3.5.3).

569. The projects, plans and activities scoped in as relevant ‘other developments’ to the assessment of cumulative impacts to hydrology, hydrogeology and flood risk are based upon a screening exercise undertaken on an initial long list of reasonably foreseeable other developments located within the Project’s zone of influence; be it consented schemes not built out or schemes for which planning consent is actively being sought.

570. Each project, plan or activity has been considered and scoped in or out on the basis of effect-receptor pathway, data confidence and the temporal and spatial scales involved.

571. The determination of the short list of other developments is documented in Appendix 5.3 (document reference 6.3.5.3).

572. It is anticipated that all other developments of significance would be constructed in accordance with a CoCP and would require an assessment of flood risk. Surface water drainage for any development proposals would also require approval from the relevant LLFA. Given the requirements to control potential detrimental effects of any development on flood risk or water quality, appropriate mitigation would be in place for these schemes to secure approval. Therefore, no significant cumulative hydrology, hydrogeology and flood risk effects arising during the construction phase of proposed new developments are likely. Furthermore, it is not expected that the Project would have an impact on any of the measures that other developments within the vicinity of the onshore works would need to incorporate during the construction phase to prevent detrimental hydrology, hydrogeology or flood risk effects elsewhere.

573. Where the receptors potentially affected by the Project are the same as those affected by the other developments scoped in per Appendix 5.3 (document reference 6.3.5.3), there is potential for the combined effect to be of a greater significance than that assessed for the Project in isolation.

574. Many of the receptors potentially affected by the Project are different to those potentially affected by the other developments scoped in per Appendix 5.3 (document reference 6.3.5.3) and in the few cases where the receptors are the same, the relative location and distance of the other development to this Project mean that there is no significant hydraulic connectivity between them and therefore no cumulative effect.

575. Following a review of the other development details, these have all been screened out for hydrology, hydrogeology and flood risk. The exception is the proposed NGSS required for the project, which is discussed below.

24.8.1 National Grid Substation

576. The proposed NGSS at Weston Marsh will be sited at a location immediately adjacent to the Project (at ECC 14) and is likely to be developed by the National Grid Electrical System Operator (NGESO) during the Project's construction period. Thus, there is potential for cumulative effects to hydrology, hydrogeology and flood risk.

577. A maximum design scenario approach was adopted for the NGSS, using high-level, typical assumptions regarding the location and parameters of this infrastructure for the sole purpose of undertaking the Cumulative Effects Assessment (CEA). The assumptions used, which are based on Industry Standards and broadly typical arrangements for National Grid scale substations, are indicated in Table 24.23.

Table 24.23 NGSS indicative MDS

Parameters	Typical assumptions for the sole purpose of CEA
NGSS Location	Within the ODOW Weston Marsh (south) search zone from the PEIR (June 2023) - to be referred to as 'the indicative connection area'
Typical site area (m^2) (fenced operational area, excluding landscaping & drainage)	Circa 140,000 m^2. Assumed to be rectangular in shape (e.g. 700m x 200m)
Typical temporary working area (m^2)	Assumed to be the same as ODOW OnSS (40,000 m^2)
Platform Level (Estimated)	Assumed to be 1m above existing ground level *(as per Weston Marsh South at PEIR)*
Construction period	Assumed same duration as for ODOW OnSS
Programme	Assumed same timing as ODOW OnSS

578. The scale of the NGSS and ODOW developments, require the projects to include measures to control potential detrimental effects of the development on hydrology, hydrogeology and flood risk. ODOW has embedded mitigation measures as part of the design and have committed to measures to mitigate the potential impacts on geology and ground conditions as part of the CoCP. It is expected that NGSS will have mitigation measures incorporated into the design thus limiting the potential for cumulative effects to occur. However, at the time of writing, information relating to the proposed mitigation measures associated with the NGSS are not available.

579. Therefore, no significant cumulative hydrology, hydrogeology and flood risk effects arising during the construction and operational phase of the NGSS are likely.

24.9 Inter-Relationships

580. This chapter has considered the effect of the Project on water quality and flood risk in relation to the proposed onshore infrastructure. Effects on offshore water quality are considered in Volume 1, Chapter 8: Marine Water Quality (document reference 6.1.8).

581. In all cases, the potential for effects of the Project to result in consequential effects on other receptors would be controlled by the measures set out in this chapter. The effects identified within this chapter are predicted to be **minor (adverse) or negligible**. None of these effects would be significant with regards the EIA Regulations. Given the localised nature of the effects, there is not considered to be potential for significant inter-related effects on any offshore receptors.

582. Impacts on water quality arising from spillages or leaching of potentially polluting material may result in contamination of the ground through pollutants being mobilized to ground in water. With the implementation of mitigation measures detailed in this chapter, the effect would be **negligible**.

583. Impacts on the volume of sediment entering watercourses or coastal waters arising from excavation of ground materials during drilling or trenching may result in increased sedimentation of water bodies. With the implementation of mitigation measures detailed in this chapter, the effect would be **negligible**.

584. There are not considered to be any significant inter-related effects between offshore and onshore parts of the Project in terms of hydrology, hydrogeology and flood risk.

24.10 Transboundary Effects

585. The likely effects of the Project would be localised. It is not considered likely that there would be any trans-boundary effects in relation to hydrology, hydrogeology or flood risk.

24.11 Conclusions

24.11.1 The potential hydrological receptors in the study area comprise the tidal and fluvial floodplain; various watercourses, including Main Rivers and ordinary watercourses or drains; groundwater; and the near-shore tidal waters of the North Sea. These receptors vary in their environmental sensitivity from **low** to **high**.

24.11.2 The assessed magnitude of the various identified impacts of the Project on water quality and flood risk varies from **minor** (adverse) to **negligible**. Overall, through the implementation of mitigation measures, including those specified in the CoCP (document reference 8.1), it is considered that the likely overall effect of the Project on water quality and flood risk throughout the construction, operation and decommissioning of the Project is **not significant** with regards the EIA Regulations.

Table 24.24: Summary of effects

Description of effect	Effect	Additional mitigation measures	Residual impact
Construction			
Onshore ECC			
Impact on watercourses	Minor (adverse) or Negligible	None (CoCP already part of the project)	Not significant
Impact on near-shore coastal waters	Minor (adverse)	None (CoCP already part of the project)	Not significant
Impact on transitional water bodies	Negligible	None (CoCP already part of the project)	Not significant
Impact on groundwater quality	Minor (adverse) or Negligible	None (CoCP already part of the project)	Not significant
Impact on flood risk	Negligible	None (CoCP and FRA already part of the project)	Not significant
Onshore Substation Construction			
Impact on watercourses	Minor (adverse) or Negligible	None (CoCP already part of the project)	Not significant
Impact on groundwater quality	Minor (adverse) or Negligible	None (CoCP already part of the project)	Not significant

Description of effect	Effect	Additional mitigation measures	Residual impact
Impact on flood risk	Negligible	None (CoCP and FRA already part of the project)	Not significant
Trenchless Drilling Works			
Impact on watercourses	Minor (adverse) or Negligible	None (CoCP already part of the project)	Not significant
Impact on near-shore coastal waters	Minor (adverse)	None (CoCP already part of the project)	Not significant
Impact on transitional water bodies	Negligible	None (CoCP already part of the project)	Not significant
Impact on groundwater quality	Minor (adverse) or Negligible	None (CoCP already part of the project)	Not significant
Impact on flood risk	Negligible	None (CoCP and FRA already part of the project)	Not significant
Landfall Installation			
Impact on watercourses	Minor (adverse) or Negligible	None (CoCP already part of the project)	Not significant
Impact on near-shore coastal waters	Minor (adverse)	None (CoCP already part of the project)	Not significant
Impact on transitional water bodies	Negligible	None (CoCP already part of the project)	Not significant
Impact on groundwater quality	Minor (adverse)	None (CoCP already part of the project)	Not significant
Impact on flood risk	Negligible	None (CoCP and FRA already part of the project)	Not significant
Operation and Maintenance			
Permanent ECC Infrastructure			
Impact on all environmental receptors	Minor (adverse) or Negligible	None (CoCP and FRA already part of the project)	Not significant
Onshore Substation			
Impact on watercourses	Minor (adverse) or Negligible	None (CoCP already part of the project)	Not significant
Impact on flood risk	Minor (adverse) or Negligible	None (CoCP and FRA already part of the project)	Not significant
Trenchless Crossings			
Impact on waterbodies and floodplain	Minor (adverse) or Negligible	None (CoCP and FRA already part of the project)	Not significant
Permanent Landfall Site			
Impact on waterbodies and floodplain	Minor (adverse) or Negligible	None (CoCP and FRA already part of the project)	Not significant

Description of effect	Effect	Additional mitigation measures	Residual impact
Decommissioning			
Decommissioning of ECC			
Impact on all environmental receptors	Minor (adverse) or Negligible	None (CoCP and FRA already part of the project)	Not significant
Decommissioning of Onshore Substation			
Impact on all environmental receptors	Minor (adverse) or Negligible	None (CoCP and FRA already part of the project)	Not significant
Cumulative			
Impact on all environmental receptors	No cumulative effect	N/A	N/A

References

DECC (2011a) Overarching National Policy Statement for Energy (EN-1). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf [Accessed: October 2023]

DECC (2011b) National Policy Statement for Renewable Energy Infrastructure (EN-3). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47856/1940-nps-renewable-energy-en3.pdf [Accessed: October 2023]

DECC (2011c) National Policy Statement for Electricity Networks Infrastructure (EN-5). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf [Accessed: October 2023]

DESNZ (2023a) Draft Overarching National Policy Statement for Energy (EN-1). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf [Accessed: October 2023]

DESNZ (2023b) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147382/NPS_EN-3.pdf [Accessed: October 2023]

DESNZ (2023c) Draft National Policy Statement for Electricity Networks Infrastructure (EN-5). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147384/NPS_EN-5.pdff [Accessed: October 2023]

Environment Agency Guidance: Land contamination risk management (LCRM), https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm [Accessed online: October 2023]

Control of Water Pollution from Construction Sites (C532), Construction Industry Research and Information Association, (CIRIA) 2001;

Environmental Good Practice on Site (C741), CIRIA 2015;

Control of water pollution from linear construction projects (C648), CIRIA 2006;

The Environment Agency's approach to groundwater protection, version 1.2, February 2018; and

The SuDS Manual (C753), CIRIA 2015.