REPORT

Boston Alternative Energy Facility – Environmental Statement

Chapter 13 Surface Water, Flood Risk and Drainage Strategy

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Executive Summary

This chapter of the Environmental Statement (ES) assesses the potential surface water and flood risk effects of the Boston Alternative Energy Facility ('the Facility'). This chapter is supported by two appendices; a Water Framework Directive (WFD) Compliance Assessment (**Appendix 13.1**), which determines whether the Facility is compliant with the requirements of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017; and a separate Flood Risk Assessment (FRA) (**Appendix 13.2**), which assesses the flood risk implications of the Facility in detail.

The study area for surface water resources and flood risk considers the Principal Application Site i.e. excluding the Habitat Mitigation Area, which is located on the tidally influenced side of the primary flood defence and therefore is not considered further in this chapter, which is focussed on fresh waters. Effects on the water environment relating to the Habitat Mitigation Area are covered within **Chapter 15 Marine Water and Sediment Quality** and **Chapter 16 Estuarine Processes.**

The Principal Application Site is located in the lower catchment of the River Witham and is drained by a number of ordinary watercourses that are maintained by the Black Sluice Internal Drainage Board (IDB). The watercourses have been extensively modified or are largely artificial, and the drainage catchment discharges into the tidal Witham (known as The Haven) through a pumping station. Water quality in the catchment is adversely affected by pressures from sewage discharges, agricultural and rural land management, and industrial discharges. Although the Principal Application Site is at risk from tidal flooding, it currently benefits from primary flood defences which provide a 1 in 150-year standard of protection. Flood risk from fluvial, surface water, groundwater and sewer flooding is low.

The potential impacts of the construction and operation of the Facility on water resources and flood risk receptors are identified in this chapter, and their significance is assessed. The following key potential impacts are described for the construction stage:

- Direct impacts on drainage systems;
- Increased sediment supply;
- Accidental release of contaminants; and
- Changes to surface water runoff and flood risk.

In addition, the following impacts are described for the operation stage:

- Changes to surface water runoff and flood risk; and

- Supply of fine sediment and other contaminants.

Following the consideration of mitigation measures to manage sediment, pollution and drainage, none of these potential impacts were determined to be significant in Environmental Impact Assessment (EIA) terms. The Facility is also compliant with the WFD and would not result in increased flood risk on or off the Principal Application Site.

13 Surface Water, Flood Risk and Drainage Strategy

13.1 Introduction

13.1.1 This chapter of the Environmental Statement (ES) describes the existing environment in relation to surface water, flood risk and drainage, and considers the potential effects during the construction, operational and decommissioning phases of the Boston Alternative Energy Facility ('the Facility'). Mitigation measures are identified, and an assessment of the potential residual effects are provided.

13.1.2 The assessment also considers the cumulative impacts of other developments alongside the effects of the Facility. The proposed methodology adhered to for the Environmental Impact Assessment (EIA) and Cumulative Impact Assessment (CIA) is discussed in **Section 13.5**.

13.1.3 This chapter should also be read in conjunction with **Chapter 11 Contaminated Land, Land Use and Hydrogeology**, **Chapter 12 Terrestrial Ecology**, **Chapter 15 Marine Water and Sediment Quality**, **Chapter 16 Estuarine Processes** and **Chapter 17 Marine and Coastal Ecology**.

13.1.4 This chapter is supported by two appendices:

- **Appendix 13.1 Water Framework Directive (WFD) Compliance Assessment**.
- **Appendix 13.2 Flood Risk Assessment (FRA)**.

13.1.5 This chapter has been prepared in accordance with the relevant National Policy Statements (NPS): The Overarching National Policy Statement for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011a); and the National Policy Statement for Renewable Energy (EN-3) (DECC, 2011b).

13.2 Legislation, Policy and Guidance

International Legislation

Water Framework Directive (2000/60/EC)

13.2.1 The Water Framework Directive (WFD) (Council Directive 2000/60/EC establishing a framework for community action in the field of water policy) was adopted by the European Commission (EC) in December 2000 (European Parliament, 2000). The WFD requires that all European Union (EU) Member States must protect and enhance the status of all aquatic ecosystems and prevent

their deterioration. Therefore, it must be ensured that new schemes do not adversely effect upon the status of aquatic ecosystems. In addition, historical modifications that are currently impacting on them need to be addressed.

13.2.2 Unlike the EU Birds and Habitats Directives (EC Directive on the Conservation of Wild Birds (2009/147/EC) (European Parliament, 2009) and EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) (European Parliament, 1992), respectively), which apply only to designated sites, the WFD applies to all water bodies, including those that are man-made.

13.2.3 There are two separate classifications (ecological and chemical) for surface water bodies which include rivers, lakes, estuaries and coastal waters. The ecological status of a surface water body is assessed according to the condition of:

- The biological quality elements, including fish, benthic invertebrates and aquatic flora;
- Hydromorphological quality elements, including morphological conditions, hydrological regime and tidal regime; and
- Physico-chemical quality elements, including thermal conditions, salinity, pH, nutrient concentrations and concentrations of specific pollutants such as copper.

13.2.4 The ecological status of surface waters is recorded on a scale of ‘high’, ‘good’, ‘moderate’, ‘poor’ and ‘bad’. The ecological status of a water body is determined by the worst scoring quality element, which means that the condition of a single quality element can cause a water body to fail to reach its WFD classification objectives. The overall environmental objective of reaching Good Ecological Status (GES) applies to these water bodies.

13.2.5 The chemical status of surface waters is assessed by compliance with environmental standards that are listed in the EC Environmental Quality Standards Directive (2008/105/EC) (European Parliament, 2008). These chemicals include priority substances and priority hazardous substances. Chemical status is recorded as either ‘good’ or ‘fail’ and is determined by the lowest scoring chemical.

13.2.6 Where the hydromorphology of a surface water body has been significantly altered as a result of anthropogenic activities, it can be designated as an Artificial or Heavily Modified Water Body (A/HMWB). An alternative environmental objective, Good Ecological Potential (GEP), applies in these cases.

Floods Directive (2007/60/EC)

13.2.7 The Floods Directive (Directive 2007/60/EC of the European Parliament and of the Council on the assessment and management of flood risks) (European Parliament, 2007) came into force in November 2007. The Floods Directive requires all EU Member States to assess whether all watercourses and coast lines are at risk of flooding and to map the associated flood extent, to identify the assets and people at risk within these areas. It requires Member States to establish flood risk management plans focused on the prevention, protection and preparedness to flooding.

National Legislation and Policy

Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

13.2.8 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (HMSO, 2017) replaced the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (HMSO, 2003a). The Regulations transpose the WFD into national law and provide for its implementation, including the designation of all surface waters (rivers, lakes, transitional (estuarine) waters, coastal waters and ground waters) as water bodies, and the requirement to achieve GES or GEP. The Regulations and associated Directions remain in force in England and Wales through the provisions of the European Union (Withdrawal) Act 2018.

Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015

13.2.9 The WFD (Standards and Classification) Directions (England and Wales) 2015 (HMSO, 2015) provide the standards used to determine the ecological or chemical status of a water body. These include:

- The thresholds for determining the biological, hydromorphological and physico-chemical status of surface water bodies; and
- The thresholds for determining the quantitative and chemical status of groundwater bodies.

Flood Risk Regulations 2009

13.2.10 The Floods Directive was transposed into UK law by the Flood Risk Regulations 2009 (HMSO, 2009) requiring the assessment and management of flood risk in England and Wales. The Regulations set out requirements related to the duties of the Environment Agency and Lead Local Flood Authorities with regard to the

preparation of Preliminary Flood Risk Assessments (PFRAs), flood hazard maps and flood risk maps and flood risk management plans.

Flood and Water Management Act 2010

13.2.11 The Flood and Water Management Act (FWMA) (HMSO, 2010) aims to improve both flood risk management and the way water resources are managed by creating clearer roles and responsibilities. This includes a lead role for local authorities in managing local flood risk (from surface water, ground water and ordinary watercourses) and a strategic overview role of all flood risk for the Environment Agency. The FWMA provides opportunities for a comprehensive, risk-based approach on land use planning and flood risk management by local authorities and other key partners.

Land Drainage Act 1991

13.2.12 The Land Drainage Act 1991 (HMSO, 1991a) assigns landowners as the responsible parties for maintaining flows in watercourses and provides local authorities with powers to compel landowners to maintain flows in watercourses.

Water Resources Act 1991, Water Act 2003 and The Environmental Permitting (England and Wales) Regulations 2016

13.2.13 The Water Resources Act 1991 (HMSO, 1991b) makes it an offence to cause or knowingly permit polluting, noxious, poisonous or any solid waste matter to enter controlled waters. The Act was revised by the Water Act 2003 (HMSO, 2003b), which establishes regulatory controls for water abstraction, water impoundment and protection of water resources. The Environmental Permitting (England and Wales) Regulations 2016 (HMSO, 2016) establish provisions for the regulation of water discharges to controlled waters, which replaced provisions from the earlier Acts.

National Planning Policy Framework (2019) and Supporting Guidance

13.2.14 The National Planning Policy Framework (NPPF) was updated in 2019 (MHCLG, 2019) and sets out the UK Government's planning policies for England. The NPPF seeks to:

- Ensure that flood risk is considered at all stages in the planning and development process;
- Avoid inappropriate development in areas at highest risk of flooding (whether existing or future);

- Safeguard land from development that is required, or likely to be required, for current or future flood management; and
- Direct development to areas with lowest risk of flooding.

13.2.15 The National Planning Practice Guidance (NPPG) on Flood Risk and Coastal Change (MHCLG, 2014) supports the NPPF with additional guidance on flood risk vulnerability classifications and managing residual risks. The NPPG makes use of the concepts of Flood Zones, Vulnerability Classifications and Compatibility in order to assess the suitability of a specific site for a certain type of development:

- Flood Zone 3 represents land with a "high" flood risk classification. Flood Zone 3a comprises land having a 1 in 100 or greater annual probability of river flooding (>1 %) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5 %) in any year. Flood Zone 3b comprises land where water has to flow or be stored in times of flood.
- Flood Zone 2 represents land with a "medium" flood risk classification and refers to land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1 % - 0.1 %) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5 % - 0.1 %) in any year.
- Flood Zone 1 represents land with a "low" flood risk classification and refers to land having a less than 1 in 1,000 annual probability of river or sea flooding in any year (<0.1 %).

13.2.16 The NPPF directs development away from areas at the highest risk of flooding via application of the Sequential Test. If, following application of the Sequential Test, it is not possible for the project to be located in zones with a lower probability of flooding; the Exception Test can be applied if appropriate. Additional information on the requirements of the NPPF and further details on the Sequential and Exception Test are provided in **Appendix 13.2**.

The Planning Act 2008

13.2.17 The Planning Act 2008 (HMSO, 2008) is the primary legislation that establishes the legal framework for applying for, examining and determining applications for Nationally Significant Infrastructure Projects (NSIPs), considering the guidance in NPSs. NSIPs are usually large-scale developments such as power generating stations, electricity lines, waste and water developments or pipelines. They require a Development Consent Order (DCO) which allows permission to construct and operate, governed by the Planning Act 2008.

13.2.18 The Planning Act 2008, the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009, the Overarching NPS for Energy (EN-1) (DECC, 2011a) and the NPS for Renewable Energy Infrastructure (EN-3) (DECC, 2011b) together set out the overarching DCO process and obligations for renewable forms of energy infrastructure. This includes projects generating energy using advanced thermal technologies, such as Energy from Waste (EfW) facilities, with a generating capacity of greater than 50 megawatts (MW).

National Policy Statements

13.2.19 Section 104 of the Planning Act 2008 requires the Secretary of State (SoS) to determine applications for NSIPs in accordance with any relevant NPS. NPSs are produced by the UK Government and provide the national policy framework against which proposals for major infrastructure projects are examined and decided on by the Planning Inspectorate. NPSs include the Government's objectives for the development of NSIPs in particular sectors and must be taken into account by the Planning Inspectorate in the examination of applications for development consent and by Ministers when making decisions.

13.2.20 The NPSs that are relevant to the Facility include:

- Overarching NPS for Energy (EN-1) (DECC, 2011a); and
- NPS for Renewable Energy (EN-3) (DECC, 2011b).

13.2.21 Part 4 of EN-1 sets out a number of 'assessment principles' that must be considered by applicants and the SoS in preparing and determining applications for nationally significant energy infrastructure. General points include (Paragraph 4.1.2); the requirement for the SoS, given the level and urgency of need for the infrastructure covered by the energy NPSs, to start with a presumption in favour of granting consent for applications for energy NSIPs. This presumption applies unless any more specific and relevant policies set out in the relevant NPS clearly indicate that consent should be refused or any of the considerations referred to in Section 104 of the 2008 Act (noted above) apply.

13.2.22 In addition to a number of the assessment principles and generic impacts covered by EN-1 (where relevant to fossil fuel generating stations); EN-3 sets out the factors (e.g. factors influencing site selection) and 'assessment and technology specific' considerations to be taken into account in the preparation and assessment of applications for renewable energy infrastructure; including relevant environmental matters, such as, amongst others, noise and vibration, landscape and visual, air quality, water quality, soil and geology, transport, and biodiversity.

13.2.23 **Table 13-1** below summarises the specific assessment requirements for surface water, flood risk and drainage, as detailed in the NPSs, together with an indication of the section of the ES chapter where each is addressed.

Table 13-1 NPS EN-1 and EN-3 Assessment Requirements with Relevance to Water Resources and Flood Risk

NPS Requirement	NPS Reference	ES Reference
Overarching National Policy Statement for Energy (EN-1)		
'Where a proposed development on land within or outside an SSSI [Site of Special Scientific Interest] is likely to have an adverse effect on an SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect, after mitigation, on the site's notified special interest features is likely, an exception should only be made where the benefits (including need) of the development at this site clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of SSSIs.'	Section 5.3.11	**Chapter 17 Marine and Coastal Ecology**
'Applications for energy projects of 1 hectare or greater in Flood Zone 1 in England or Zone A in Wales and all proposals for energy projects located in Flood Zones 2 and 3 in England or Zones B and C in Wales should be accompanied by a flood risk assessment (FRA). A FRA will also be required where an energy project less than 1 hectare may be subject to sources of flooding other than rivers and the sea (for example surface water), or where the Environment Agency (EA), Internal Drainage Board or other body have indicated that there may be drainage problems. This 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.'	Section 5.7.4	**Appendix 13.2** discusses flood risk in detail.
'Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent. The ES should in particular describe: • The existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges;	Section 5.15.2, 5.15.3	**Chapter 13 Surface Water, Flood Risk and Drainage Strategy** The existing quality of waters is considered in **Section 13.6.** **Appendix 13.1** considers the

NPS Requirement	NPS Reference	ES Reference
• Existing water resources affected by the proposed project and the impacts of the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Catchment Abstraction Management Strategies); • Existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics; and • Any impacts of the proposed project on water bodies or protected areas under the Water Framework Directive and source protection zones (SPZs) around potable groundwater abstractions.'		impacts under the WFD**.**
'Where the development is subject to EIA [Environmental Impact Assessment] the applicant should ensure that the ES [Environmental Statement] clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. The applicant should provide environmental information proportionate to the infrastructure where EIA is not required to help the Infrastructure Planning Commission (IPC) [now the Planning Inspectorate] consider thoroughly the potential effects of a proposed project.'	Section 5.3.3	**Chapter 17 Marine and Coastal Ecology** (and **Appendix 17.1**). The Existing Environment is considered in **Section 13.6**.
National Policy Statement for Renewable Energy Infrastructure (EN-3)		
EfW generating stations may also require significant water resources but are less likely to be proposed for coastal sites. For these proposals applicants should consider, in particular, how plant will be resilient to: • increased risk of flooding; and • increased risk of drought affecting river flows.	Section 2.3.3	**Appendix 13.2 (FRA)** Considers the risk of flooding and changes to river flows.
Generic water quality and resource impacts are set out in Section 5.15 of EN-1. The design of water cooling systems for EfW (Energy from Waste) and biomass generating stations will have additional impacts on water quality, abstraction and discharge. These may include: • Discharging water at a higher temperature than the receiving water, affecting the biodiversity of aquatic flora and fauna; • Use of resources may reduce the flow of watercourses, affecting the rate at which sediment is deposited,	Section 2.5.84	**Chapter 15 Marine Water and Sediment Quality** Potential impacts are considered in **Section 13.7.**

NPS Requirement	NPS Reference	ES Reference
conditions for aquatic flora and potentially affecting migratory fish species (e.g. salmon); • Fish impingement and/or entrainment – i.e. being taken into the cooling system during abstraction; and • Discharging water containing chemical anti-fouling treatment of water for use in cooling systems may have adverse impacts on aquatic biodiversity.		

Regional Policy

Anglian River Basin District River Basin Management Plan

13.2.24 The River Basin District Management Plan (RBMP) (Defra & Environment Agency, 2016) is a strategic document that sets out the objectives that have been set for implementation of the WFD at a regional (River Basin District (RBD)) level. The purpose of a RBMP is to provide a framework for protecting and enhancing the benefits provided by the water environment. To achieve this, and because water and land resources are closely linked, it also informs decisions on land-use planning.

13.2.25 The second RBMP for the Anglian RBD was finalised by Defra and the Environment Agency in December 2015 and published in February 2016. This document sets out the current state of the water environment according to WFD parameters, pressures affecting the water environment, environmental objectives for protecting and improving the waters, programme of measures to improve the water environment and deliver WFD objectives, actions needed to achieve the objectives, progress since the first RBMP was published in 2009, and also informs decisions on land-use planning because water and land resources are closely linked.

Lincolnshire Flood Risk and Drainage Management Framework

13.2.26 Lincolnshire County Council (LCC), in partnership with local district councils and the Environment Agency, created the Lincolnshire Flood Risk and Drainage Management Partnership Framework in 2010 as part of its role as Lead Local Flood Authority (LLFA) (LCC, 2010). The partnership implements the recommendations of the Flood and Water Management Act 2010 (HMSO, 2010) aimed at ensuring that the local communities and infrastructure of Lincolnshire are better protected from flood risk and improving the resilience of all aspects of planning and service provision in the future. It includes a unique strategy group chaired by the Environment Agency to ensure the strategic direction of the Environment Agency's flood and coastal risk management role is integrated with

that of the LLFA.

13.2.27 The Lincolnshire Flood Risk and Drainage Management Partnership is led by LCC (as the LLFA) and supported by the Environment Agency, District Councils, Anglian Water and the Internal Drainage Boards (IDBs). The partnership coordinates countywide functions, empowering the Risk Management Authorities to deliver flood risk management and drainage solutions at a local level.

Local Planning Policy

13.2.28 NPS EN-1 (DECC, 2011a) recognises that local development plan documents may be both important and relevant to decision making, however, in the event of conflict with an NPS, it is expected that the latter will prevail. The following policies will be considered during the EIA process:

South-East Lincolnshire Local Plan 2011 – 2036

13.2.29 The South-East Lincolnshire Local Plan 2011 – 2036 was adopted in March 2019 (South-East Lincolnshire Joint Strategic Planning Committee (the Joint Committee), 2019). The Joint Committee is a partnership of Boston Borough Council (BBC), South Holland District Council and LCC who have worked together to create a single Local Plan for South-East Lincolnshire. Before this Local Plan was adopted, the Development Plan for South-East Lincolnshire consisted of the 'saved policies' of the Boston Borough Local Plan and the South Holland District Local Plan and the adopted policies of the Minerals and Waste Plan.

- **Policy 2: Development Management** – this is a general policy that relates to sustainable development considerations. Reference is made specifically to sustainable drainage and flood risk and the impact or enhancement for areas of natural habitats.
- **Policy 3: Design of New Development** – this policy relates to the creation of distinctive places through the use of high quality and inclusive design and layout and, where appropriate. Design which is inappropriate to the local area, or which fails to maximise opportunities for improving the character and quality of an area, will not be acceptable. The mitigation of flood risk through flood-resistant and flood-resilient design and sustainable drainage systems (SuDS) and the incorporation of existing hedgerows and trees and the provision of appropriate new landscaping to enhance biodiversity, green infrastructure, flood risk mitigation and urban cooling are specifically referenced.
- **Policy 4: Approach to Flood Risk** – much of the land within the Local Plan area is at significant risk of flooding and this will increase with climate

change. The Plan provides a robust response to this issue and at the same time facilitates appropriate development to continue in a way that is resilient to the potential consequences of flooding.

- **Policy 28: The Natural Environment** – this policy relates to protecting, enhancing and managing natural assets.
- **Policy 30: Pollution** – development proposals will not be permitted where, taking account of any proposed mitigation measures, they would lead to unacceptable adverse impacts on humans and the environment, including surface and groundwater quality.
- **Policy 31: Climate Change and Renewable and Low Carbon Energy** – all development proposals will be required to demonstrate that the consequences of current climate change has been addressed, minimised and mitigated. This includes the adoption of the sequential approach and Exception Test to flood risk and the incorporation of flood-mitigation measures in design and construction and the protection of the quality, quantity and availability of water resources. This policy also relates to renewable energy facilities.

Black Sluice Internal Drainage Board Policy Statement

13.2.30 The Black Sluice IDB is responsible for meeting the national policy aims and objectives in the Black Sluice Internal Drainage District (IDD), as stated in the National Flood and Coastal Erosion Risk Management Strategy for England 2011 (the National Strategy) (EA, 2011). The National Strategy's overall aim is to ensure that the risk of flooding and coastal erosion is properly managed in a co-ordinated way by a variety of organisations to manage decision-making and action at an appropriate level.

13.2.31 The strategy sets out five objectives in pursuance of the overall aims as follows:

- Understand the risks of flooding and coastal erosion, working together to put in place long-term sustainable plans to manage these risks;
- To avoid inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks;
- Build, maintain and improve flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society as well as achieving wider environmental benefits.

- Increase public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient; and
- Improving the detection, forecasting and issue of warnings of flooding, co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding.

13.2.32 The IDB makes decisions regarding flood risk within the District, taking into account: the assets in place considering their design standard and life, Environment Agency and LLFA flood risk strategies, plans and maps and other information such as the history of flooding and land use impacts. They are responsible for 755 km of watercourses, 4 km of raised embankments and 34 pumping stations (63 pumps) within the Black Sluice IDD which covers 44,722 hectares (ha). They carry out their responsibilities by:

- Building, maintaining and improving flood and coastal erosion risk management systems;
- Regulating activities – avoiding inappropriate development and land management;
- Effective communication and transparency; and
- Carrying out conservation duties and consideration of specific environmental measures, e.g. when carrying out work (maintenance or improvements) they aim to avoid unnecessary or long-term damage to agricultural interests or to natural habitats and species, monitor gains or losses of biodiversity and take opportunities to carry out enhancement work where possible.

Assessment Guidance

13.2.33 The assessment methodology used in this chapter follows the approach set out in **Chapter 6 Approach to EIA**. Where appropriate, reference has been made to established methods for undertaking environmental impact assessments (EIAs) for water and flood risk receptors presented in guidance from the Department of Transport (DfT) (2015), Department for Communities and Local Government (DCLG) (2014) and Highways Agency (2008).

13.2.34 Unique assessment approaches are taken for the WFD and FRA, and these are described in **Appendix 13.1** and **Appendix 13.2** respectively.

13.3 Consultation

13.3.1 Consultation undertaken throughout the pre-application phase has informed the

approach taken and the information provided in this chapter. A summary of the comments received from the Planning Inspectorate within the Environmental Scoping Opinion (The Planning Inspectorate, 2018) of particular relevance to surface water and flood risk is provided in **Table 13-2.**

Table 13-2 Consultation and Responses

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
The Planning Inspectorate Scoping Opinion, July 2018	The Inspectorate notes that groundwater levels stated within the Scoping Report are derived from existing information from the Boston Biomass plc (note: this facility is operated by Biomass UK No 3 Limited) plant. The ES should explain the extent to which this data is relevant to the receiving environment for the Proposed Development. The Scoping Report states that the British Geological Survey (BGS) flood risk information indicates that the site is not located within an area with potential ground water flooding. To aid the reader the ES should include the BGS groundwater flood risk map. The ES should include a ground water risk assessment to assess the potential effects that accidental spills of pollutants may have on the groundwater. Furthermore, if de-watering is required during the construction phase of the Proposed Development, the environmental effects of de-watering should be assessed and presented within the ES.	Potential impacts on groundwater levels and quality are addressed in **Chapter 11 Contaminated Land, Land use and Hydrogeology**
	The Applicant proposes to scope out an assessment of significant environmental effects to The Wash Inner WFD water body on the basis that the distance from the Proposed Development and the embedded mitigation measures will avert a likely significant effect. However, the Scoping Report does not include sufficient information about the	Potential impacts on the Wash Inner WFD water body are considered in **Appendix 13.1**, with supporting assessments provided in **Chapter 17 Marine and Coastal Ecology, Chapter 16 Estuarine Processes.**

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
	embedded mitigation to enable the Inspectorate to scope this matter out of the ES. Therefore, any likely significant environmental effects on The Wash must be assessed in the ES, with appropriate cross reference to the ecological assessment(s) taking into account the nature conservation designations associated with this feature (The Wash Special Protection Area (SPA), SSSI and Ramsar and The Wash and North Norfolk Coast Special Area of Conservation (SAC)).	
Section 42 Consultation Response – Lincolnshire County Council (LCC), 1st August 2019	The surface water drainage strategy details are satisfactorily covered in the PEIR and the Lincolnshire Highways and Floods Department are content with the chapter in respect of surface water drainage.	Point noted. For clarity, potential impacts on flood risk during construction and operation are considered in **Section 13.7**. A Flood Risk Assessment has been carried out and is provided separately in **Appendix 13.2.**
Section 42 Consultation Response – Anglian Water, 6th August 2019	Reference is made to principal risks of flooding from the above project being sea, river and surface water flooding. The risk of flooding from sewers is considered to be low.	Point noted. Potential impacts on flood risk during construction and operation are considered in **Section 13.7**. A Flood Risk Assessment has been carried out and is provided separately in **Appendix 13.2.**
	We understand from our earlier discussions that there is a potential requirement for a foul connection as part of the construction phase for the development. However, there is no reference made to a foul connection to the public sewerage network for the above development as part of the construction or operation of the site. This should be considered further as part of the Preliminary Environmental Information Report and Flood Risk Assessment.	This is discussed in **Table 13-7**.
	We welcome the intention to develop a surface water strategy in accordance with the	This is discussed in detail in **Appendix 13.2.**

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
	surface water hierarchy. With surface water to be discharged as high up the hierarchy of drainage options as practicable.	
	Appendix 13.2. Reference is made to the preparation of a surface water drainage strategy to support the DCO application to the Planning Inspectorate which will be informed by the earlier strategy for Biomass UK No 3 Ltd site. We understand from our earlier discussions regarding the above project that there is no intention to discharge surface water into the public sewerage network. It would be helpful if this could be made clear in the submitted Preliminary Environmental Information Report and Flood Risk Assessment.	This is discussed in detail in **Appendix 13.2** and in **Table 13-7**.
Section 42 Consultation Response – Boston Borough Council (BBC), 6th August 2019	We note that the existing flood defences are to be replaced - does the new Quay improve existing flood defences and if so, how.	This is discussed in detail in **Appendix 13.2.**
Section 42 Consultation Response – Environment Agency, 6th August 2019	We have reviewed Chapter 13, along with Appendix 13.1 (ref: PB6934-RHD-01-ZZ-RP-N-2013_A13.1, dated 17 June 2019) and Appendix 13.2 (ref: PB6934-RHD-01-ZZ-RP-N-2013_A13.2, dated 17 June 2019). We note that the intention is to discharge foul drainage, from welfare facilities to a mains connection if a suitable one is available (Table 13.7 Embedded Mitigation Measures). We support this approach and would require further consultation on alternative methods of foul drainage if this is not feasible. We note the intention to determine the specific	Our approach is set out in **Table 13-7**. The preferred option for disposal of foul drainage will be determined during the post-consent detailed design process, with the need for further consultation with the Environment Agency secured as a DCO Requirement.

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
	approach during detailed design work – if this is post-permission, we will ask for a Requirement to be included in the Development Consent Order (DCO) to secure details to be submitted and approved following further consultation with us.	
	In respect of flood risk to and from the proposed development, our comments are based on the information currently available; however, more detailed information is required. Before any final agreements can be reached, we will require detailed information such as: • drawings, including construction details and cross sections of the proposed wharf and how it interacts with the existing defence through and immediately adjacent to the site; • details of any proposed defence re-alignment and how the required defence level will be achieved; • proposed ground levels across the site; • construction methodology outlining how a minimum defence level of 6.5mAOD will be maintained at all times during construction.	Further details are provided in **Appendix 13.2.** Details of the wharf are provided in **Figure 5.2**.
	Updated extreme sea level estimates, with a base date of 2018, are expected to be released in late August 2019 and therefore we would expect these to be used in further assessment work. We will be able to supply these to you, upon request, when they are released.	This is discussed in detail in **Appendix 13.2**.

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
	There are some activities proposed, which fall under the remit of the Environmental Permitting Regulations (EPR) 2016. For example, working on either the front line or former line of land reclamation defence, or dredging in the channel to maintain access to the wharf would fall under the remit of these Regulations. Section 150 of the Planning Act 2008 allows applicants to "include provision [within the DCO] the effect of which is to remove a requirement for a prescribed consent or authorisation to be granted, only if the relevant body has consented to the inclusion of the provision". At this time we would not consent to the inclusion of such a provision, as we will need to discuss with you, in more detail, the most appropriate mechanism to protect the flood defence assets, to ensure the project will not increase flood risk to third parties.	The risk of flooding or damage to flood defences is discussed in **Appendix 13.2**.
	Appendix 13.1 WFD compliance assessment. The Witham (Transitional) Water Body ID is incorrect in Plate A13.1.4 (page 14) and should read GB530503000100.	Noted and updated in **Appendix 13.1.**
	Appendix 13.1 WFD compliance assessment. On page 21 with regard to the question, 'Is in a water body with a phytoplankton status of moderate, poor or bad?', phytoplankton was classified as at 'Bad' status in 2016 (EA Catchment Data Explorer) and you should demonstrate you have considered whether there is a pathway from the proposed activities that may cause phytoplankton to deteriorate.	This is noted and has been assessed and updated in **Appendix 13.1.**

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
	Appendix 13.1 WFD compliance assessment. Table A13.1 3 – for the Witham (The Haven) waterbody (page 22) – please note that saltmarsh is WFD high sensitivity habitat, not low sensitivity as suggested in the scoping table. Further detailed assessment will therefore be required on the grounds that the project would involve impacts to an area of high sensitivity habitat.	Updated in **Appendix 13.1.**
	Appendix 13.1 WFD compliance assessment. The key construction and operational activities (not including vessel movements) for the proposed scheme will not be larger than 0.5 km2' (page 22) - has any necessary navigational dredging been included in this figure?	Updated in **Appendix 13.1.**
	Appendix 13.1 WFD compliance assessment. The quality element 'Introduce or spread invasive non-native species (INNS)' on page 23 has not been addressed fully and a more detailed assessment is required. Will a biosecurity plan feature in the Project Environmental Management Plan?	Further details are provided in **Appendix 13.1, Chapter 12 Terrestrial Ecology** and **Chapter 17 Marine and Coastal Ecology**.
	Appendix 13.1 WFD compliance assessment. A13.7.1 – We do not agree with the statement that the project 'will have no local effects on the hydromorphological, physico-chemical and biological quality elements…'. Clearly there will be localised impacts, albeit probably (pending final design details and further assessments) not at a scale sufficient to impact compliance.	This has amended to reflect limited, highly localised effects in **Appendix 13.1.**
	Appendix 13.1 WFD compliance assessment. Is there any evidence available	Amended in **Appendix 13.1.**

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
	from the Witham European eel population to support the following statement on page 39? 'In addition, European eels are prone to infestation with the swimbladder parasite, Anguillicoloides (Anguillicola) crassus, which can cause thickening of the swimbladder walls influence the sensitivity of eels to sound'.	
	Appendix 13.1 WFD compliance assessment. We would also request that an additional monitoring measure is added (under paragraph 13.1.2), due to the acknowledgement in 15.7.23 that sediment contamination is present (above Cefas Action Level 1 for some contaminants). Therefore, monitoring of contaminant levels and associated water quality parameters is advised during the construction phase of the project (as has been done for the Ipswich and Boston Tidal Barrier projects).	Monitoring is now included as a measure during the construction phase in **Appendix 13.1.**
	Appendix 13.1 WFD compliance assessment. We would also like to see evidence that consideration has been given to any opportunities to deliver WFD mitigation through the scheme. We encourage discussion of any potential opportunities to contribute towards efforts to achieve Good Ecological Potential.	Updated in **Appendix 13.1.** Opportunities to deliver WFD mitigation and contribute towards achieving Good Ecological Potential can be accommodated as the detailed design evolves and through establishment of statements of common ground during examination.
	Appendix 13.2. A13.2.4 - The “Great Sluice” referred to is incorrect and should be changed to “Grand Sluice”.	Amended in **Appendix 13.2.**
	Appendix 13.2. A13.3.9 - The long term aim of the Boston Combined Strategy is to raise the Witham Haven banks, at intervals in the future, to provide a 1 in 300 standard of protection	Addressed in **Appendix 13.2.**

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
	in 100 years. At present this level for the Facility site is estimated to be 7.2mAOD. However, we will review this level when updated climate change allowances are published later this year. If the proposed wharf or a set-back defence line through the site is constructed at a lower level, we will require information to demonstrate how this can be adapted in the future to achieve the required defence level (7.2mAOD, or as required when updated climate change allowances are published), or decommissioned such that future defence raising projects by the Environment Agency will not be financially disadvantaged by the presence of the development.	
	Appendix 13.2. A13.3.10 States the Environment Agency may require access to the frontage. We can confirm that access to inspect the defences will be required at all times. Consideration also needs to be given to any impact on our ability to move maintenance plant from the bank upstream of the site to the bank downstream: whether access through the site can be arranged or the additional cost of an alternative route quantified.	Addressed in **Appendix 13.2.**
	Appendix 13.2. The Flood Risk Assessment (FRA) mentions the South-East Lincolnshire Local Plan at paragraph A13.4.5. We would draw your attention to Policy 4 (Approach to flood risk) of the plan, which includes a 50m buffer from the toe of the raised Witham Haven banks (flood defences), to allow access for construction and maintenance. This was	Policy considered in **Appendix 13.2.**

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
	included in the Policy to ensure delivery of the Haven Banks Project, which is fundamental to the continued protection of Boston.	
	Appendix 13.2. A13.5.5 includes a typo in respect of the 5th December 2018 – this should read 2013, as should the reference in A13.5.6.	Amended in **Appendix 13.2.**
	Appendix 13.2. A13.5.7 and A13.5.14 refers to the Boston SFRA and the relative probability of flooding maps. This SFRA has been superseded by the South-East Lincolnshire SFRA (March 2017) – these probability maps are no longer part of the current SFRA and reference to them should be removed.	Amended in **Appendix 13.2.**
	Appendix 13.2. A13.8.23 States that "no personnel are anticipated to be required to sleep on-site". If there is any possibility that sleeping on-site will be required this needs to be included in your FRA.	Wording amended to confirm this in **Appendix 13.2.**
	Appendix 13.2. There is little mention in the FRA in relation to the feedstock facility and whether the RDF will be contained or bunded. Please clarify what measures will be in place to stop the waste material being washed away, creating an environmental hazard, if the site floods (or signpost us to where this issue is addressed in the assessment).	Addressed in **Appendix 13.2**.
Section 42 Consultation Response – Lincolnshire Wildlife Trust (LWT), 6th August 2019	Chapter 11 Contaminated Land Use and Hydrology and Chapter 13 relating to Surface Water, Flood Risk and Drainage should also consider impacts and opportunities for biodiversity.	Impacts on biodiversity resulting from the drainage system are identified in **Section 13.7**, Impacts 1 and 5. Opportunities for biodiversity creation are identified in **Chapter 12 Terrestrial Ecology** and **Chapter 9 Landscape and Visual Impact Assessment** and will be accommodated as the detailed design evolves.

Consultee and Date	Response	Chapter Section Where Consultation Comment is Addressed
	Paragraph 13.7.5 identifies that spillage of contaminants into the surface water system from the development via IDB drains may have an adverse impact on ecology in terrestrial, coastal and marine habitats. Please confirm what measures are in place to prevent spillage and clean up any harmful contaminants following release into the environment."	The embedded mitigation laid out in **Table 13-7** provides measures to prevent spillage and contamination. These measures will be included in the Code of Construction Practice (CoCP).
	The South-East Lincolnshire Local Plan 2011-2036 (adopted March 2019) recognises opportunities to increase biodiversity through 'sustainable drainage systems' (SuDS). Its primary aim is to minimise the impact of development on the water environment, reduce flood risk and provide habitats for wildlife. We would like to see biodiversity opportunities included, where possible, in the final design for any attenuation ponds and other SuDS features created.	Addressed in **Section 13.7** and also in **Appendix 13.2.**
Section 42 Consultation Response – Royal Society for the Protection of Birds (RSPB), August 2019	Impact on water quality. It appears that water management on the site will be managed through an attenuation pond and then released to the River Witham via surface water drains. It is essential that enough information is provided at submission to demonstrate that water quality will not be reduced as a result of any discharges arising from the site. The RSPB also highlights that impacts on water quality may arise from vessels using the wharf area. Sufficient information must be provided to demonstrate that potential adverse impacts on water quality as a result of the container vessels will be avoided.	Drainage is discussed in **Appendix 13.2**. Water quality is covered in **Section 13.7**.

13.4 Assessment Methodology

Impact Assessment Methodology

Overall approach

13.4.1 This section sets out the overall approach to the assessment and highlights the main potential effects on surface water, flood risk and drainage receptors and builds on the methodology discussed in **Chapter 6 Approach to EIA**. Separate, more detailed, methodologies for the WFD compliance assessment and FRA can be found in **Appendix 13.1** and **Appendix 13.2**, respectively.

13.4.2 Two key groups of effects have been identified for the purpose of defining effect significance:

- Surface waters: these are potential effects on the physical (including hydrology and geomorphology), biological or chemical character of surface waters, potentially impacting on secondary receptors such as wetlands or abstractions, and WFD water body status.
- Drainage and flood risk: these are the potential effects of the project on-site drainage, conveyance and surface water flooding.

13.4.3 Whilst there are clear links between the two impact groups, the assessment of receptor sensitivity and magnitude of effect may differ. Definitions of receptor sensitivity and value and effect magnitude and significance are provided in the paragraphs below. These definitions have been developed with reference to guidance provided by the Department of Transport (2015) and Highways Agency (2008).

13.4.4 Our proposed approach is summarised in **Chapter 6 Approach to EIA** and follows the four-level classification of receptor sensitivity and value and effect magnitude recommended by the Department of Transport (2015) (i.e. high, medium, low, negligible) rather than the five-level system recommended in Highways Agency (2008) (very high, high, medium, low, negligible) to ensure that it is consistent with the approach adopted in the other chapters of the EIA. However, the Highways Agency (2008) guidance has been fully consulted and used to inform the definition of each key assessment term where appropriate.

Sensitivity

13.4.5 Receptor sensitivity has been defined with reference to the adaptability, tolerance, recoverability and value of individual receptors. **Table 13-3** provides the criteria for appraisal of the value and sensitivity for identified water resources and flood

risk receptors based on professional judgement.

Table 13-3 Definitions of Sensitivity for Water Resources and Flood Risk Receptors

Sensitivity	Definition
High	Receptor has very limited capacity to tolerate changes to hydrology, geomorphology and water quality or flood risk. *Water resources* • Controlled waters with an unmodified, naturally diverse hydrological regime, a naturally diverse geomorphology with no barriers to the operation of natural processes and good water quality. • Supports habitats or species that are highly sensitive to changes in surface hydrology, geomorphology or water quality. *Flood risk* • Highly Vulnerable Land Use, as defined by NPPF NPPG on Flood Risk and Coastal Change (DCLG, 2014). • Land with more than 100 residential properties (after Design Manual for Roads and Bridges (DMRB), Highways Agency, 2008).
Medium	Receptor has limited capacity to tolerate changes to hydrology, geomorphology and water quality or flood risk. *Water resources* • Controlled waters with hydrology that sustains natural variations, geomorphology that sustains natural processes; and water quality that is not contaminated to the extent that habitat quality is constrained. • Supports or contributes to habitats or species that are sensitive to changes in surface hydrology, geomorphology and/or water quality. *Flood risk* • More Vulnerable Land Use, as defined by NPPF NPPG on Flood Risk and Coastal Change (DCLG, 2014). • Land with between 1 and 100 residential properties or more than 10 industrial premises (after Highways Agency, 2008).
Low	Receptor has moderate capacity to tolerate changes to hydrology, geomorphology and water quality or flood risk. *Water resources* • Controlled waters with hydrology that supports limited natural variations, geomorphology that supports limited natural processes and water quality that may constrain some ecological communities. • Supports or contributes to habitats that are not sensitive to changes in surface hydrology, geomorphology or water quality.

Sensitivity	Definition
	Flood risk • Less Vulnerable Land Use, as defined by NPPF NPPG on Flood Risk and Coastal Change (DCLG, 2014). • Land with 10 or fewer industrial properties (after Highways Agency, 2008).
Negligible	Receptor is generally tolerant of changes to hydrology, geomorphology, and water quality or flood risk. *Water resources* • Controlled waters with hydrology that does not support natural variations, geomorphology that does not support natural processes and water quality that constrains ecological communities. • Aquatic or water-dependent habitats and/or species are tolerant to changes in hydrology, geomorphology or water quality. *Flood risk* • Water Compatible Land Use, as defined by NPPF NPPG on Flood Risk and Coastal Change (DCLG, 2014). • Land with limited constraints and a low probability of flooding of residential and industrial properties (after Highways Agency, 2008).

Value

13.4.6 It should be noted that high value and high sensitivity are not necessarily linked with respect to a particular impact. A receptor could be of high value but have a low sensitivity to an effect. It is therefore important not to inflate the significance of an impact due to the value of the receptor. Instead, the value can be used as a modifier for the sensitivity assigned to the receptor. Definitions for the value of surface waters are provided in **Table 13-4**.

Table 13-4 Definitions of Value Levels for Water Resources and Flood Risk Receptors

Value	Definition
High	Receptor has a high quality and rarity; and is an internationally or nationally important resource with very limited potential for offsetting, compensation or substitution. *Water resources* • Supports or contributes to designated habitats or species of international or national importance (e.g. Special Area of Conservation (SAC), Special Protection Area (SPA), and Site of Special Scientific Interest (SSSI)).

Value	Definition
	• Licensed potable abstractions (surface water). *Flood risk* • Nationally significant infrastructure. • Internationally or nationally designated planning policy areas.
Medium	Receptor has a medium quality and rarity; and is a regionally important resource with limited potential for offsetting, compensation or substitution. *Water resources* • Supports or contributes to habitats or species of UK regional value (Site of Nature Conservation Interest (SNCI), Regionally Important Geological Site (RIGS)). • Licensed non-potable abstractions and unlicensed potable abstractions (surface water). *Flood risk* • Locally significant infrastructure. • Local planning policy designated sites.
Low	Receptor has a low quality and rarity; and is a locally important resource with some potential for offsetting, compensation or substitution. *Water resources* • Supports or contributes to habitats or species of local value (e.g. Local Nature Reserve (LNR)). Unlicensed non-potable abstractions (surface water). *Flood risk* • Drainage that does not discharge to Critical Drainage Areas.
Negligible	Receptor has a very low quality and rarity; and is not considered to be an important resource. *Water resources* • Does not support or contribute to habitats or species of particular importance. • No abstractions (surface water). *Flood risk* • No significant infrastructure.

Magnitude

13.4.7 Receptor magnitude has been defined with consideration to the spatial extent, duration, frequency and severity of the effect. Impact magnitude is defined in **Table 13-5** (note that some effects are adverse while others may be beneficial).

Table 13-5 Definitions of Impact Magnitude for Water Resources and Flood Risk Receptors

Value	Definition
High	Fundamental, permanent / irreversible changes, over the whole receptor, and / or fundamental alteration to key characteristics or features of the receptor's character or distinctiveness. *Water resources* • Permanent changes to geomorphology and/or hydrology that prevent natural processes operating. • Permanent and/or wide scale effects on water quality or availability. • Permanent loss or long-term (>5 years) degradation of a water supply source (surface water) resulting in prosecution. • Permanent or wide scale degradation of habitat quality. • Deterioration in water body status or prevention of future achieving status objectives. *Flood risk* • Permanent or major change to existing flood risk. • Reduction in on-site flood risk by raising ground level in conjunction with provision of compensation storage. • Increase in off-site flood risk due to raising ground levels without provision of compensation storage. • Failure to meet either sequential or exception test (if applicable).
Medium	Considerable, permanent / irreversible changes, over the majority of the receptor, and / or discernible alteration to key characteristics or features of the receptor's character or distinctiveness. *Water resources* • Medium-term (1-5 years) effects on water quality or availability. • Medium-term (1-5 years) degradation of a water supply source (surface water), possibly resulting in prosecution. • Habitat change over the medium-term (1-5 years). *Flood risk* • Medium-term (1-5 years) or moderate change to existing flood risk. • Possible failure of sequential or exception test (if applicable). • Reduction in off-site flood risk within the local area due to the provision of a managed drainage system.

Value	Definition
Low	Discernible, temporary (throughout project duration) change, over a minority of the receptor, and / or limited but discernible alteration to key characteristics or features of the receptor's character or distinctiveness. *Water resources* • Short-term (<1 year) or local effects on water quality or availability. • Short-term (<1 year) degradation of a water supply source (surface water). • Habitat change over the short-term. *Flood risk* • Short-term (<1 year), temporary or minor change to existing flood risk. • Localised increase in on-site or off-site flood risk due to increase in impermeable area. • Passing of sequential and exception test.
Negligible	Discernible, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the receptor's character or distinctiveness. *Water resources* • Intermittent impact on local water quality or availability. • Intermittent or no degradation of a water supply source (surface water). • Very slight local changes to habitat that have no observable impact on dependent receptors. *Flood risk* • Intermittent or very minor change to existing flood risk. • Highly localised increase in on-site or off-site flood risk due to increase in impermeable area.

Impact significance

13.4.8 The potential significance of an effect is a function of the sensitivity and value of the receptor and the magnitude of the effect. The interaction between sensitivity and value and the significance of effect that results is shown in a matrix in **Chapter 6 Approach to EIA**. It should be noted that value and sensitivity are not necessarily linked with respect to a particular effect. A receptor could be of high value but have a low sensitivity to an effect. The value is therefore used as a modifier for the sensitivity assigned to the receptor.

13.4.9 Assessment of effect significance is qualitative and reliant on professional experience, interpretation and judgement. The matrix shown in **Chapter 6 Approach to EIA** should therefore be viewed as a framework to aid

understanding of how a judgement has been reached, rather than as a prescriptive, formulaic tool. Note that effects may be adverse or beneficial. Effects that result in major or moderate effects are considered to be 'significant' in EIA terms. Adverse significant effects may require mitigation; beneficial significant effects could contribute to the case in favour of the project.

Cumulative Impact Assessment

13.4.10 Cumulative impacts will be assessed in accordance with the methodology set out in **Chapter 6 Approach to EIA**. For this chapter, these impacts are discussed in **Section 13.8**.

Transboundary Impact Assessment

13.4.11 There are no transboundary impacts with regards to surface water, flood risk and drainage because the Application Site is not located near to any international boundaries. Transboundary impacts are therefore scoped out of this assessment and will not be considered further.

13.5 Scope

Study Area

13.5.1 The study area for surface water resources and flood risk has been defined on the basis of surface hydrological catchments. Catchments have been included in the study area if they contain components of the proposed development or are hydrologically connected to (i.e. upstream or downstream) these catchments. The Environment Agency's WFD river water body catchments are based on surface hydrological catchments and have therefore been used to delineate the boundaries of the study area and define surface water receptors (**Figure 13.1**).

13.5.2 The study area for surface water resources and flood risk considers the Principal Application Site i.e. excluding the Habitat Mitigation Area, which is located on the tidally influenced side of the primary flood defence and therefore is not considered further in this chapter, which is focussed on fresh waters. Effects on the water environment relating to the Habitat Mitigation Area are covered within **Chapter 15 Marine Water and Sediment Quality** and **Chapter 16 Estuarine Processes.**

Data Sources

13.5.3 The assessment was undertaken with reference to several sources, as detailed in **Table 13-6.**

Table 13-6 Key Information Sources

Data Source	Reference
Environment Agency's Flood Map for Planning	https://flood-map-for-planning.service.gov.uk/
Environment Agency's Product 4 data	Environment Agency, Flood Risk Information. Reference: CCN/2018/101492. Dated: 11/10/2018
Environment Agency's Product 8 data	Environment Agency, Flood Risk Information. Reference: CCN/2018/101492. Dated: 11/10/2018
Environment Agency's Risk of Flooding from Surface Water	https://flood-warning-information.service.gov.uk/long-term-flood-risk/map (Accessed 23/09/2020)
Environment Agency's Risk of Flooding from Rivers and Sea	https://flood-warning-information.service.gov.uk/long-term-flood-risk/map (Accessed 23/09/2020)
Environment Agency's Risk of Flooding from Reservoirs	https://flood-warning-information.service.gov.uk/long-term-flood-risk/map (Accessed 23/09/2020)
Environment Agency's Catchment Data Explorer for WFD River Basin Districts Management Catchments, Operational Catchments and WFD water bodies;	https://environment.data.gov.uk/catchment-planning/ (Accessed 25/08/2020)
Internal Drainage Board (IDB) data regarding classification of drains within the Black Sluice Internal Drainage Board	https://www.blacksluiceidb.gov.uk/about/map-of-district/ (Accessed 25/08/2020)
Anglian River Basin District River Basin Management Plan	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718327/Anglian_RBD_Part_1_river_basin_management_plan.pdf (Accessed 25/08/2020)
Lincolnshire Flood Risk and Water Management Partnership Framework	https://www.lincolnshire.gov.uk/downloads/file/2365/joint-lincolnshire-flood-risk-and-water-management-partnership-framework-draft-strategy-2019-2050-pdfa (Accessed 26/08/2020)
South-East Lincolnshire Local Plan 2011 - 2036	http://www.southeastlincslocalplan.org/adopted-plan/ (Accessed 25/08/2020)
Natural England Designated Sites website for information on SACs, SPAs, and SSSIs.	https://designatedsites.naturalengland.org.uk/ (Accessed 26/08/2020)

Assumptions and Limitations

13.5.4 This assessment is based on a range of publicly available information and data. Although it is considered that the individual datasets provided are robust, there is

a level of uncertainty associated with their use in this impact assessment rather than their original intended purpose (e.g. WFD status metrics used as a proxy for the broader characteristics of a surface watercourse). However, this is a broadly accepted approach to forming a baseline, on which to base an assessment of effects to surface waters, flood risk and drainage.

13.6 Existing Environment

13.6.1 This section covers the freshwater water bodies and does not consider groundwater or estuarine water bodies. Estuarine water and sediment quality are discussed in **Chapter 15 Marine Water and Sediment Quality**. Estuarine processes are discussed in **Chapter 16 Estuarine Processes**. Further information on the designated sites is provided in **Chapter 17 Marine and Coastal Ecology**. **Chapter 11 Contaminated Land, Land Use and Hydrogeology** describes contaminated land, land use and hydrogeology.

Surface Water Drainage

13.6.2 The eastern extent of the Principal Application Site is defined in part by a primary flood defence bank along the River Witham. The tidal extent of the River Witham at this point is known as The Haven, which starts from the Grand Sluice, to the mouth of The Wash. The River Witham rises south of Grantham, passes through Lincoln and drains into The Wash via The Haven approximately 7 km downstream of the proposed development site (**Figure 13.1**). The downstream reaches of the river, where it meets the sea, includes a wide range of intertidal features including intertidal mudflats, saltmarshes and sand and shingle banks and beaches.

13.6.3 In addition, there is an extensive network of drainage systems within the vicinity of the Principal Application Site (Black Sluice IDB, 2018).

13.6.4 Although the Principal Application Site falls within an IDD which is administered by the Black Sluice IDB, the watercourses located within the boundary of the Principal Application Site are not directly managed or maintained by the Black Sluice IDB, although they are located within the IDB's Catchment 6: Wyberton Marsh and are directly connected to the IDB drainage network (**Figure 13.1**). The catchment has a total area of 1,981 ha.

13.6.5 The watercourses drain into the Wyberton Towns Drain (Drain Number 19, 20 and 32) to the south and the Bittern Way Drain (Drain Number 25; itself a tributary of the Wyberton Towns Drain) to the west. The Wyberton Towns Drain flows south and eastwards until it discharges into The Haven through Wyberton Marsh pumping station (a three-pump station with a maximum capacity of 2,803 l/s and

a maximum design water level of 0.00 m AOD).

13.6.6 The watercourses located within the Principal Application Site are largely open channel / ditches. The Bittern Way Drain, Wyberton Towns Drain and other exposed surface watercourses flow in very straight, narrow, artificial channels with largely unreinforced earth banks.

13.6.7 Although there are two offline ponds marked on OS mapping of the Principal Application Site, the northernmost (adjacent to The Haven) is no longer present. The southern pond is an artificial feature with extensive vegetation growth that is used as a surface water attenuation pond for the industrial estate.

Water Quality

13.6.8 WFD classification data from the Environment Agency's Catchment Data Explorer (2016) indicate that water quality in the surface drainage network is below the required standards. Surface waters are affected by pressures from sewage discharges, agricultural and rural land management and industrial discharges. These pressures combine to result in low dissolved oxygen concentrations, high concentrations of phosphate, aldrin, dieldrin, endrin, isodrin and tributyltin and high temperatures. Water quality is sufficiently poor to adversely effect upon fish populations.

Flood Risk

13.6.9 Environment Agency flood zone maps (EA Flood Map for Planning, undated) indicate that the Principal Application Site is located in Flood Zone 3; however, the Environment Agency has confirmed this reflects tidal flood risk rather than fluvial flood risk.

13.6.10 The Principal Application Site currently benefits from the presence of primary defences with an effective crest level of approximately 6.1 m AOD which provide a 1 in 150-year standard of protection. These are in the process of being raised to 6.4 m AOD by the Environment Agency as part of the 'Haven Banks' upgrade programme. Areas of the Principal Application Site also benefit from a secondary flood defence, known as the Sea Bank or 'Roman Bank', with a crest level of approximately 5.2 m AOD.

13.6.11 Surface water flood risk on the Principal Application Site is primarily very low, with small areas of increased surface water flood risk, across the Principal Application Site, associated with existing drains / watercourses and localised low-lying points. The Principal Application Site is largely agricultural although there may be some highway drainage associated with Nursery Road which bisects the western part

of the Principal Application Site.

13.6.12 The risk of flooding from sewers is considered to be low. The Principal Application Site is not located in an area at risk of flooding from canals or reservoirs.

13.6.13 Therefore, the primary source of flooding that may affect the Principal Application Site is from tidal flooding with a minimal risk of surface water flooding.

13.6.14 The FRA in **Appendix 13.2** provides a detailed description of the baseline flood risk of the study area.

13.7 Potential Impacts

Embedded Mitigation

13.7.1 Embedding mitigation into the project design is a type of primary mitigation and is an inherent aspect of the EIA process. As part of the project design, several embedded mitigation measures have been proposed to reduce potential effects on surface water, flood risk and drainage strategy. These measures are considered standard industry practice for this type of development.

13.7.2 **Table 13-7** below outlines the key embedded mitigation relevant for this assessment. Where embedded mitigation measures have been developed into the design of the Facility with specific regard to surface water and flood risk, these are provided below and are described in the CoCP, this CoCP will be based on the Outline CoCP (document reference 7.1) provided with this DCO application. Any further mitigation measures suggested within this chapter are therefore considered to be additional to this embedded mitigation.

Table 13-7 Embedded Mitigation Measures for Water Resources and Flood Risk

Parameter	Mitigation Measures Embedded into the Project Design
Sediment Management	A CoCP will be developed for the construction activities and will adhere to construction industry good practice guidance as detailed in the Environment Agency's Pollution Prevention Guidance (PPG) notes (including PPG01, PPG05, PPG08 and PPG21)[1] (EA, 2007) and CIRIA's 'Control of water pollution from construction sites: Guidance for consultants and contractors (C532)' (CIRIA, 2001). It should be noted that although the Environment Agency's PPG documents have been withdrawn in England, the notes still provide useful information for managing pollutants on-site and although no longer Environment Agency guidance it is still referred to as best practice. Specific measures to control sediment supply that will be captured within the CoCP include: • Temporary works areas (e.g. mobilisation and storage areas) within the development area will comprise hardstanding of permeable gravel aggregate

[1] *The PPGs are revoked as regulatory guidance in England, but still provide a useful guide for best practice measures.*

Parameter	Mitigation Measures Embedded into the Project Design
	underlain by geotextile, or other suitable material to a minimum of 50% of the total area to minimise the area of open ground. • Subsoil exposure will be minimised and strips of undisturbed vegetation will be retained on the edge of the working area where possible (e.g. buffer zones along the drainage ditches). • On-site retention of sediment will be maximised by routing all drainage through the site drainage system. • The drainage system will include silt fences at the foot of soil storage areas to intercept sediment runoff at source. Where practicable, runoff will be routed into swales, which incorporate check dams to further intercept sediment and/or attenuation ponds which incorporate sediment forebays. Suitable filters will be used to remove sediment from any water discharged into the surface drainage network; • Additional silt fences will be included in parts of the working area that are in proximity to surface drainage channels. • Soil and sediment accumulation on road surfaces will be minimised as far as reasonably practicable by washing the wheels of vehicles leaving site and, where required, clearance of the road surface. Traffic movement would be restricted to minimise the potential for surface disturbance. • Minimise unnecessary sediment run-off from the Principal Application Site during construction by intercepting surface drainage and, if necessary, employing silt traps (e.g. Sedimats) adjacent to the banks of The Haven within the designated work areas. • Dampen areas of dryness to reduce the risk of windblown dust particles entering the water body. • All concreting works to use concrete with an anti-washout additive. • Heras screens with debris netting to be erected to prevent errant concrete from entering The Haven with the designated work areas.
Site Drainage	Specific measures to manage site drainage that will be captured within the CoCP and associated plans include: • Changes in surface water runoff as a result of the increase in impermeable area from the development will be attenuated and discharged at a controlled rate, in consultation with the LLFA, Black Sluice IDB and Environment Agency. • The controlled runoff rate will be equivalent to the greenfield runoff rate. • A Surface and Foul Water Drainage Plan (SFWDP) will be developed prior to construction and implemented to minimise water within the construction areas and ensure ongoing drainage of surrounding land. This will comprise a sealed surface water drainage system where water enters the excavations during construction from surface runoff or groundwater seepage and is then pumped via settling tanks, sediment basins or mobile treatment facilities to remove sediment, before being discharged into local ditches or drains via temporary interceptor drains in order to prevent increases in fine sediment supply to the watercourses.
Pollution Prevention	Specific measures relating to pollution prevention that will be captured within the CoCP include: • Concrete and cement mixing and washing areas will be situated at least 10 m away from the nearest watercourse. These will incorporate settlement and recirculation

Parameter	Mitigation Measures Embedded into the Project Design
	systems to allow water to be re-used. All washing out of equipment will be undertaken in a contained area, and all water will be collected for off-site disposal. • All fuels, oils, lubricants and other chemicals will be stored in an impermeable bund with at least 110 % of the stored capacity. Damaged containers will be removed from site. All refuelling will take place in a dedicated impermeable area, using a bunded bowser. The refuelling and fuel storage area will be located at least 10 m from the nearest watercourse. Biodegradable oils will be used where possible. • Spill kits will be available on-site at all times. Sand bags or stop logs will also be available for deployment on the outlets from the site drainage system in case of emergency spillages. • Foul drainage (e.g. from construction welfare facilities) will be collected through a mains connection to an existing mains sewer (if a suitable connection is identified as being available or a spur connection to the site can be implemented from an existing mains sewer line, following consultation with Anglian Water during the design process), or collected in a septic tank located within the development boundary and transported off-site for disposal at a licensed facility. The specific approach to dealing with foul drainage will be determined during detailed design with consideration of the availability of mains connections and the number of working hours for site attendees. If this approach is not possible, further consultation with the Environment Agency will be required to find an alternative solution. The preferred option will be determined post-consent during the design phase, and a commitment to undertake further consultation with the Environment Agency will be included as a DCO Requirement.
Post Construction Surface Water Drainage	Post construction surface water drainage requirements will be presented in a surface and foul water drainage strategy for the operation of the Facility and will be designed to meet the requirements of the NPPF and NPS EN-1, with runoff limited, where feasible, through the use of infiltration techniques which can be accommodated within the area of development. The drainage strategy will be developed according to the principles of the SuDS discharge hierarchy. Generally, the aim will be to discharge surface water runoff as high up the following hierarchy of drainage options as reasonably practicable: i) into the ground (infiltration); ii) to a surface water body; iii) to a surface water sewer, highway drain or another drainage system; or iv) to a combined sewer. There is no intention to discharge surface water into the public sewerage system unless no alternatives can be identified. The South-East Lincolnshire Local Plan 2011-2036 aims to minimise the impact of development on the water environment, reduce flood risk and provide habitats for wildlife. In order to comply with this, the design of the SuDS will discussed with the ecology team in order to increase biodiversity at the existing attenuation pond and throughout the SuDS.

Worst Case

13.7.3 This section establishes the Worst Case Scenario (WCS) for each key impact category, forming the basis for the subsequent impact assessment.

13.7.4 Full details of the range of development options being considered are provided

within **Chapter 5 Project Description**. For the purpose of this chapter, only those design parameters with the potential to influence the level of impact to relevant receptors are identified. Therefore, if the design parameter is not described below in **Table 13-8**, it is not considered to have a material bearing on the outcome of this assessment.

13.7.5 The realistic WCS identified for this section, as detailed in **Table 13-8**, are also applied to the CIA. When the WCS for the project in isolation does not result in the worst case for cumulative impacts, this is addressed within the cumulative impacts section of this chapter.

Table 13-8 Worst Case Assumptions

Impact	Parameter
Construction	
Area of construction-stage development with potential to impact upon water receptors	Construction footprint (terrestrial): 20.24 ha Total construction duration 46 to 48 months Length of watercourse / drains affected by the works (within the works area): 2.66 km 1% of the IDB's Wyberton Marsh drainage catchment affected by the works
Operation	
Area of permanent development with potential to impact upon water receptors	25 years operational lifespan (unless extended) Total operational footprint (terrestrial): 15.7 ha Length of watercourse / drain habitat lost to development: 2.66 km
Decommissioning	
Decommissioning activities	For the purposes of a WCS, an assumption has been made that the decommissioning activities and duration will be similar to those experienced during the construction phase of work, apart from the wharf, which will be retained because it forms the new primary flood defence.

Potential Impacts during Construction

13.7.6 Four potential impacts on water resources and flood risk receptors resulting from the construction stage have been identified:

- Direct impact on drainage system;
- Increased sediment supply;
- Accidental release of contaminants; and
- Changes to surface water runoff and flood risk.

13.7.7 It should be noted that impacts associated with groundwater or abstractions are covered in **Chapter 11 Contaminated Land, Land Use and Hydrogeology**.

Impact 1: Direct Impact on Drainage Systems

13.7.8 There are no IDB drains that would be directly impacted by the Facility. However, there are some minor ordinary watercourses that are not maintained by the IDB within the Wyberton Marsh catchment that are adjacent to or within the Principal Application Site, and it is anticipated that, as a WCS, all watercourses falling within the Principal Application Site will be directly impacted and filled in. This would lead to the direct loss of all geomorphological and hydrological features associated with these watercourses, and any habitats that they support. The potential loss of habitat and associated impacts is also considered in **Chapter 12 Terrestrial Ecology**.

13.7.9 The watercourses are fed by surface runoff and do not bring in flows from outside the footprint of the Facility. All runoff will be managed by a new site drainage system, and therefore the hydrology of the area will not be adversely affected.

13.7.10 A new watercourse 250 m in length was cut alongside the extension of Bittern Way to the Biomass UK No. 3 Ltd site road as part of the drainage strategy for the Biomass UK No. 3 Ltd site. In addition, a new pond to provide attenuation and storage volume for surface water runoff from the industrial estate was created as well as underground storage capacity for Biomass UK No. 3 Ltd. These drainage features have been created to deal with flow from both the power station site and the Facility's Principal Application Site, and will not be directly affected by the Facility.

Magnitude of Impact

13.7.11 The direct impact on the drainage system as a result of the construction is expected to have a negligible magnitude of effect on the surface water drainage network as a whole due to the artificial nature of those water bodies directly affected. In addition, the embedded mitigation measures listed in **Table 13-7** that will be implemented during construction to prevent changes to runoff rates and the supply of sediment and contaminants to the remainder of the surface drainage network will lead to a **negligible** magnitude of effect.

Sensitivity and Value of Receptor

13.7.12 The drains that will be directly affected by the construction of the Facility are small ordinary watercourses. They are artificial and have relatively poor water quality, therefore the sensitivity and value of these drains are assessed to be **low**.

Significance of Effect

13.7.13 The significance of the direct effect of the construction on the drains within the

Principal Application Site is expected to be **negligible**, as a result of the **low** sensitivity of the drains and the **negligible** magnitude of effect.

Mitigation Measures

13.7.14 No additional measures to those embedded into the design of the construction activities are required due to the **negligible** magnitude of effect expected during the construction works.

13.7.15 Once construction is complete, geomorphological improvements and habitat creation could be implemented in the channels of the artificial water bodies and in the attenuation pond (e.g. planting of native species and targeted naturalisation of the channel banks) in order to mitigate the loss of water bodies elsewhere. This would help to reduce potential effects on biodiversity, as discussed in **Chapter 12 Terrestrial Ecology**.

Residual Effects

13.7.16 The residual effect resulting from the direct disturbance of drains is therefore predicted to remain as a **negligible** effect during the construction phase of the Facility.

Impact 2: Increased Sediment Supply

13.7.17 Construction activities for the Facility will involve earthworks and creation of areas of bare ground by removing surface vegetation cover. Site preparation, ground excavations and other construction activities which have the potential to increase sediment supply will take place across the Principal Application Site. These construction activities could result in an increase in the supply of fine sediment (e.g. clays, silts and fine sands) to surface water bodies through surface runoff and the erosion of exposed soils.

13.7.18 Increased sediment supply could increase the turbidity in the water column and encouraging enhanced deposition of fine sediment within the watercourses that receive drainage from the Principal Application Site (noting that although the drains within the footprint of the Facility will be infilled, the larger watercourses which they currently connect to will remain undisturbed). Furthermore, increased sediment loads could potentially smother existing bed habitats, reduce light penetration and reduce dissolved oxygen concentration, adversely affecting biota (e.g. macrophytes, aquatic invertebrates and fish) and adversely affecting the quality of aquatic habitats.

13.7.19 However, the development will include a range of embedded mitigation measures

to reduce the potential for an increase in the supply of fine sediment, including minimising the area of open ground at any one time, implementation of buffer zones adjacent to watercourses, storing and reinstating topsoil in line with guidance and using hardstanding in mobilisation areas. This means that the exposed working area which has the potential to supply sediment will be restricted as far as practicable.

Magnitude of Impact

13.7.20 An area of approximately 20.24 ha would be disturbed by construction activities. This means there is a direct route for any sediment generated from construction activities to easily enter the surface drainage system through surface runoff without natural attenuation. It should also be noted that the watercourses are directly connected to the tidal River Witham. However, the total area of disturbed ground accounts for only 1 % of the Wyberton Marsh drainage catchment. The potential for release of sediment from the Principal Application Site during construction to the identified drains from construction is expected to have a **negligible** magnitude of effect due to the embedded mitigation measures and the small proportion of the catchment affected by construction activities.

Sensitivity and Value of Receptor

13.7.21 The construction of the Facility is within the Wyberton Marsh catchment and will directly and indirectly affect the drains within this catchment. The drains within the vicinity of the site have relatively poor water quality and therefore the sensitivity and value of these drains are considered to be **low**.

Significance of Effect

13.7.22 The significance of the effect of construction on the IDB drains from the potential of release of sediment from the site is expected to be **negligible**, as a result of a **low** sensitivity and **negligible** magnitude of effect.

Mitigation Measures

13.7.23 The sediment management measures embedded into the design of the working activities are considered to represent a comprehensive suite of best practice measures that are in line with construction best practice. Furthermore, the pre-mitigation effect is considered to be of **negligible** magnitude. No further mitigation measures are therefore recommended at this stage.

Residual Effects

13.7.24 Due to the extent of the embedded mitigation measures, the magnitude of effect prior to further mitigation is considered to be **negligible**, and no further mitigation

is proposed. The residual effect resulting from the release of sediment during construction is therefore predicted to reduce to a **negligible** effect within the IDB drains.

Impact 3: Accidental Release of Contaminants

13.7.25 There is the potential for the accidental release of lubricants, fuels and oils from construction machinery through spillage, leakage and in-wash from vehicle storage areas after rainfall and direct release from construction machinery working adjacent to the IDB drains. There is also the potential for accidental release of nutrient-rich foul waters (from welfare facilities) and construction materials (including concrete) into the surface waters during construction.

13.7.26 If a significant leakage or spillage occurs, there is the potential for adverse effects upon water quality if contaminants (including nutrients) enter the surface drainage network. The IDB drains identified within the study area are directly connected to the tidal River Witham. These water quality effects have the potential to adversely affect ecology (particularly fish and macroinvertebrates; see **Chapter 12 Terrestrial Ecology** and **Chapter 17 Marine and Coastal Ecology**) if pollutant concentrations are sufficiently high.

13.7.27 Measures will be put in place to prevent spillage and to clean up any harmful contaminants that are released into the environment, following industry best practice such as CIRIA's Environmental Good Practice on Site, 3rd Edition (2010); and Construction Industry Publication (CIP) Construction Environmental Manual (2010). These measures will be provided in the CoCP.

13.7.28 Construction activities which disturb the ground (including excavation and piling) could potentially introduce contaminants into the underlying groundwater bodies (particularly shallow aquifers). These potential impacts to groundwater bodies are discussed in **Chapter 11 Contaminated Land, Land Use and Hydrogeology**.

Magnitude of Impact

13.7.29 The scale of the potential impact upon a surface catchment is likely to be proportional to the area of each catchment that would be affected during construction (i.e. the total footprint of construction activities).

13.7.30 An area of approximately 20.24 ha would be disturbed by construction activities. This accounts for approximately 1 % of the total surface drainage catchment of the Wyberton Marsh catchment. Although this is a small proportion of the total catchment, activities will take place adjacent to or over the drains. This means there is a direct route for any contaminants to easily enter the surface drainage

system through surface runoff. Despite this, the potential for release of contaminants to the identified IDB drains from construction is expected to have a **negligible** magnitude of effect.

Sensitivity of Receptor

13.7.31 The construction works of the Facility will directly and indirectly affect the IDB drains within the Wyberton Marsh catchment, therefore there is the potential for the accidental release of contaminants to impact on the drains. The drains within the vicinity of the site have poor water quality and therefore the sensitivity and value of these drains are considered to be **low**.

Significance of Effect

13.7.32 The significance of the effect of construction on the IDB drains from the potential release of contaminants is expected to be **negligible**, as a result of a **low** sensitivity and **negligible** magnitude.

Mitigation Measures

13.7.33 The embedded measures to minimise impacts to surface water resources will help to mitigate the accidental release of contaminants by preventing the immediate discharge of contaminated water from the construction site into the surface drainage network. Furthermore, the pre-mitigation impact is considered to have a **negligible** magnitude of effect. No further mitigation measures are therefore recommended at this stage.

Residual Effects

13.7.34 Following implementation of these additional mitigation measures, the potential for impacts associated with the release of contaminants to the identified surface water bodies will be reduced to a **negligible** magnitude. The residual effect resulting from the release of contaminants during construction is therefore predicted to reduce to a **negligible** effect within the Wyberton Marsh catchment.

Impact 4: Changes to Surface Water Runoff and Flood Risk

13.7.35 The initial site preparations and construction activities associated with the Principal Application Site have the potential to alter surface water flows and drainage patterns by:

- Altering existing flow paths and changing the distribution of surface drainage across the development site;
- Reducing infiltration and increasing surface runoff as a result of soil compaction by construction vehicles; and

- Increasing the proportion of impermeable surfaces in a catchment and therefore reducing infiltration. The development of surface infrastructure also has the potential to change surface flows and infiltration rates as a result of changes to land use (i.e. by increasing the proportion of impermeable surfaces in a drainage catchment) and altering site runoff characteristics.

13.7.36 The construction of the Facility therefore has the potential to increase surface water runoff, which could adversely affect the hydrology and geomorphology of the surface drainage network as the Principal Application Site is currently largely undeveloped and the majority of the Principal Application Site is permeable. The Facility will increase the impermeable area of the Principal Application Site. The impact of climate change (increased rainfall intensity and duration) also has the potential to increase the volume of surface water runoff from the Principal Application Site.

Magnitude of Impact

13.7.37 The project will include embedded mitigation measures to control surface runoff during the construction phase, including the creation of a construction stage drainage system (**Table 13-7**). These measures will help to control the release of surface waters from construction activities and prevent changes to surface runoff and flood risk. The magnitude of effect is therefore expected to be **negligible**.

Sensitivity of Receptor

13.7.38 Any changes to flood risk are likely to be confined to the Wyberton Marsh drainage catchment, which contains more than ten commercial and industrial units. The receptor has therefore been assigned a **medium** sensitivity.

Significance of Effect

13.7.39 The **negligible** magnitude of effect and the **medium** sensitivity of the receptors would result in an effect of **minor adverse** significance.

Mitigation Measures

13.7.40 Surface water from the Principal Application Site shall be managed through the use of an existing attenuation pond located to the south of the Principal Application Site before discharging via surface water ditches at a controlled rate into the IDB drain adjacent to the Principal Application Site.

Residual Effects

13.7.41 Following implementation of these additional mitigation measures, the potential for effects associated with increased surface water flood risk will be reduced to a

negligible magnitude.

Potential Impacts during Operation

13.7.42 Two potential effects on water resources and flood risk receptors resulting from the operational stage have been identified:

- Changes to surface water runoff and flood risk; and
- Supply of fine sediment and other contaminants.

Impact 1: Changes to Surface Water Runoff and Flood Risk

13.7.43 The permanent above-ground infrastructure will result in permanent changes to land use and the drainage system from the existing greenfield agricultural land, the majority of which is permeable, to a permanent increase in the impermeable area. This increase in impermeable area has the potential to create a permanent increase in surface water flood risk associated with the existing watercourses / ditches and IDB drains.

Magnitude of Impact

13.7.44 The project will adhere to a surface and foul water drainage strategy which will be developed in accordance with the principles of the SuDS hierarchy. This will limit runoff where feasible through the use of infiltration techniques which can be accommodated within the area of the development. The controlled runoff rate will be equivalent to the greenfield runoff, therefore storage and attenuation will be provided of sufficient volume that there will be no additional runoff during flood events. It is anticipated that this additional attenuation and storage will be managed through the use of the existing attenuation pond located to the south of the Principal Application Site before discharging via surface ditches at a controlled rate.

13.7.45 Behind the primary flood defence, a sealed surface water drainage system will be built to manage any increase in surface water runoff. This will only provide drainage to elements of the project, including the contingency bale storage area, that lies between the primary and secondary flood defences. The water collected will predominantly be used to supply the lightweight aggregate (LWA) plant which has a significant water demand, with only a minimal amount being discharged under an environmental permit. These mitigation measures will help to control the release of surface waters from the permanent development and prevent changes to surface runoff and flood risk, therefore the magnitude of effect is expected to be **low**.

Sensitivity of Receptor

13.7.46 Any changes to flood risk are likely to be confined to the Wyberton Marsh drainage catchment, which contains more than ten commercial and industrial units. The receptor has therefore been assigned a **medium** sensitivity.

Significance of Effect

13.7.47 The **low** magnitude of effect and the **medium** sensitivity of the receptors would result in an effect of **minor adverse** significance.

Mitigation Measures

13.7.48 Surface water from the Principal Application Site shall be managed through the use of a SuDS which includes a sealed surface water drainage system and water used in the LWA plant. Only a small amount will be discharged via surface water ditches at a controlled rate into the IDB drain adjacent to the Principal Application Site. The use of an attenuation pond will also provide an opportunity to incorporate biodiversity enhancements to the project.

Residual Effects

13.7.49 Following implementation of these additional mitigation measures, the potential for effects associated with increased surface water flood risk will be reduced to a **negligible** magnitude.

Impact 2: Supply of Fine Sediment and Other Contaminants

13.7.50 The operation of the Facility, could result in the supply of fine sediment, fuels, oils and lubricants from the road network and other impermeable surfaces within the Principal Application Site. This could potentially affect the geomorphology and water quality in the surface drainage network that receives runoff from the site, and consequently impact upon aquatic ecology.

13.7.51 In addition, silt obtained from dredging the berthing pocket for the Facility will be stored on land pending use as binder in the LWA plant. A free draining area will be constructed for freshly landed silt piles with integrated drains with automatic pumps which will take all run off water to process water collection tanks using pumps. This will be re-used within the LWA process for formulation mixing prior to pelletisation and minimise any fresh water required for the process.

13.7.52 Foul drainage at the Principal Application Site will be collected through a mains connection to the existing local authority sewer system which serves the industrial estate on the northern boundary. Surface water from impervious areas will also be collected in a sealed surface drainage system and used in the LWA plant.

Magnitude of Impact

13.7.53 An area of approximately 15.7 ha will be affected by the Facility. This accounts for approximately 0.8 % of the total Wyberton Marsh drainage catchment. The surface and foul water drainage strategy will be developed according to the principle of the SuDS discharge hierarchy which will use the attenuation pond or a sealed surface water drainage system to remove pollutants from the water and prevent contaminants (including nutrients) from entering the surface water drainage system as detailed in **Table 13-7**. The potential for release of contaminants to the identified IDB drains from operational activities is therefore expected to have a **negligible** magnitude of effect.

Sensitivity of Receptor

13.7.54 The drains within the vicinity of the Principal Application Site have relatively poor water quality and therefore the sensitivity and value of these drains are considered to be **low**.

Significance of Effect

13.7.55 The significance of the effect of operational activities on the IDB drains from the potential of release of contaminants is expected to be **negligible**, as a result of a **low** sensitivity and **negligible** magnitude.

Mitigation Measures

13.7.56 The **negligible** effect on this receptor means that there is no requirement to introduce any additional mitigation measures.

Residual Effects

13.7.57 The residual effect on the surface water body catchments from runoff of sediments and other contaminants during the operation of the Facility will remain as **negligible**.

Potential Impacts during Decommissioning

13.7.58 For the purposes of the EIA, an assumption has been made that the Facility will have an operational lifetime of 25 years. Although it is common for such developments to be operational for a longer period.

13.7.59 A decision will be made as to whether the operating life of the Facility will be extended, which would involve upgrading and re-permitting in line with the current legislative requirements at that time.

13.7.60 At the end of the Facility's working life, it would be decommissioned and removed

and the site reinstated to an agreed condition. No decision has been made regarding the final decommissioning policy for the Facility, as it is recognised that industry best practice, rules and legislation change over time. Whilst the details regarding the decommissioning of the project are currently unknown, considering the WCS which would be the removal and reinstatement of the current land use at the site, it is anticipated that the impacts would be no worse than those during construction.

13.7.61 The decommissioning methodology would need to be finalised nearer to the end of the lifetime of the Facility so as to be in line with current guidance, policy and legislation at that point. Any such methodology would be agreed with the relevant authorities and statutory consultees. The decommissioning works would be subject to a separate licencing and consenting approach, which are relevant at the time.

13.8 Cumulative Impacts

13.8.1 **Table 13-9** below presents the construction and operational impacts considered above, and an assessment of whether these have the potential to act cumulatively with other projects.

Table 13-9 Potential Cumulative Impacts

Impact	Potential for cumulative impact	Data confidence	Rationale
Direct impact on drainage system during construction	No	Medium	The only drainage system that has the potential to be impacted is that directly covered by the Principal Application Site. This does not overlap with any other projects and cannot act cumulatively.
Increased sediment supply during construction	No	Medium	Embedded mitigation measures are in place to ensure that the anticipated impact of sediment supply on the Principal Application Site is negligible. Therefore, additional sediment from another project will not act cumulatively.
Accidental release of contaminants during construction	No	Medium	Embedded mitigation is in place to ensure that the construction of the Facility will not lead to the release of contaminants or contaminated water into surface or groundwater bodies. Therefore, there is no potential to act cumulatively with other projects.
Changes to surface water runoff and	No	Medium	Due to embedded mitigation measures including a drainage strategy, the

Impact	Potential for cumulative impact	Data confidence	Rationale
flood risk during construction			impacts to surface water runoff and flood risk is anticipated to be negligible and therefore will not act cumulatively with other projects.
Changes to surface water runoff and flood risk during operation	No	Medium	Although the project will lead to an increase in impermeable surfaces within the Principal Application Site boundary, this will be mitigated by a drainage strategy including a sealed drainage system. Therefore, it will not have potential to act cumulatively with other projects.
Supply of fine sediment and other contaminants during operation	No	Medium	There is predicted to be a negligible impact of fine sediment and other contaminants during operation due to embedded mitigation in the form of a drainage strategy. Therefore, there is no potential for cumulative impacts.

13.8.2 Due to the lack of any significant impacts arising as a result of the Facility, there is no mechanism for cumulative impacts with other development projects to occur, therefore cumulative impacts are not considered further in this assessment.

13.9 Transboundary Impacts

13.9.1 There are no transboundary impacts that need to be considered as part of this development.

13.10 Inter-Relationships with Other Topics

13.10.1 This chapter has inter-relationships with **Chapter 11 Contaminated Land, Land Use and Hydrogeology**, **Chapter 12 Terrestrial Ecology**, **Chapter 15 Marine Water and Sediment Quality** and **Chapter 17 Marine and Coastal Ecology**. **Table 13-10** details the topic inter-relationship in this chapter.

Table 13-10 Chapter Topic Inter-Relationships

Topic and description	Related Chapter	Where addressed in this Chapter
Impacts upon groundwater quality	Chapter 11	**Section 13.7**, Impacts 3 and 6
Impacts on ecology resulting from impacts to surface waters	Chapter 12, Chapter 15	**Section 13.7**, Impacts 1, 2, 3 and 6

Topic and description	Related Chapter	Where addressed in this Chapter
Impacts on marine water quality resulting from contamination of fresh waters	Chapter 17	**Section 13.7**, Impacts 2, 3 and 6.

13.11 Interactions

13.11.1 The impacts identified and assessed in this chapter have the potential to interact with each other, which could give rise to synergistic impacts because of that interaction. The worst case impacts assessed within the chapter take these interactions into account and for the impact assessments are considered conservative and robust. For clarity, the areas of interaction between impacts are presented in **Table 13-11**, along with an indication as to whether the interaction may give rise to synergistic impacts.

Table 13-11 Interaction Between Impacts

Potential interaction between impacts				
Construction				
	1 Direct impact on drainage system	2 Increased sediment supply	3 Accidental release of contaminants	4 Changes to surface water runoff and flood risk
1 Direct impact on drainage system	-	Yes	Yes	Yes
2 Increased sediment supply	Yes	-	Yes	Yes
3 Accidental release of contaminants	Yes	Yes	-	No
4 Changes to surface water runoff and flood risk	Yes	Yes	No	-
Operation				
	1 Changes to surface water runoff and flood risk		2 Supply of fine sediment and other contaminants	
1 Changes to surface water runoff and flood risk	-		No	
2 Supply of fine sediment and	No		-	

Potential interaction between impacts		
other contaminants		
Decommissioning		
It is anticipated that the decommissioning impacts will be similar in nature to those of construction.		

13.12 Summary

13.12.1 Following the characterisation of the existing environment, and an assessment of the potential impacts of the Facility on surface water and flood risk; it has been concluded that there will be no significant impacts associated with the construction, operation or decommissioning of the Facility with the implementation of embedded and additional mitigation measures. Due to the negligible significance of impacts, there is considered to be no potential for cumulative impacts with other projects. A summary of impacts is shown in **Table 13-12** below.

Table 13-12 Impact Summary

Potential Impact	Receptor	Value/ Sensitivity	Magnitude	Significance	Mitigation	Residual Effect
Construction						
Impact 1: Direct disturbance of surface watercourses	IDB drains	Low	Negligible	Negligible	Embedded mitigation measures only	Negligible
Impact 2: Increased sediment supply	IDB drains	Low	Negligible	Negligible	Embedded mitigation measures only	Negligible
Impact 3: Accidental release of contaminants	IDB drains	Low	Negligible	Negligible	Embedded mitigation measures only	Negligible
Impact 4: Changes to surface water runoff and flood risk	IDB drains	Medium	Negligible	Minor adverse	An existing attenuation pond will be used before discharging via surface water ditches at a controlled rate into the IDB drain adjacent to the Site.	Negligible
Operation						
Impact 1: Changes to surface water runoff and flood risk	IDB drains	Medium	Negligible	Minor adverse	An existing attenuation pond will be used before discharging via surface water ditches at a controlled rate into the IDB drain adjacent to the Site.	Negligible
Impact 2: Supply of fine sediment and other contaminants	IDB drains	Low	Negligible	Negligible	Embedded mitigation measures only	Negligible
Decommissioning						
It is anticipated that impacts on surface water and flood risk receptors resulting from decommissioning stage activities will be similar in nature to those resulting from construction stage activities.						

13.13 References

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