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North Lincolnshire Green Energy Park

Volume 6

Environmental Statement

6.2.9 Water Resources and Flood Risk

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Acronyms and Abbreviations

Name	Description
AEP	Annual exceedance probability
AGI	Above Ground Installation
CBMF	Concrete Block Manufacturing Facility
CCUS	Carbon Capture Utilisation and Storage Facility
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
CO ₂	Carbon Dioxide
CoCP	Code of Construction Practice
CSM	Conceptual Site Model

Name	Description
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
DFE	Design Flood Event
DHPWN	District Heat and Private Wire Network
EFW	Energy from Waste
EIA	Environmental Impact Assessment
EQS	Environmental Quality Standard
ERF	Energy Recovery Facility
ERM	Environmental Resources Management
ES	Environmental Statement
EU	European Union
EV	Electric Vehicle
FRA	Flood Risk Assessment
H ₂	Hydrogen
HRA	Habitat Regulations Assessment
IDB	Internal Drainage Board
LDF	Local Development Framework
LLFA	Lead Local Flood Authority
NFPA	National Fire Protection Association
NLC	North Lincolnshire Council
NLGEP	North Lincolnshire Green Energy Park
NPPF	National Planning Policy Framework
NPS	National Policy Statement
PEIR	Preliminary Environmental Information Report
PRF	Plastic Recycling Facility
RHTF	Residue Handling and Treatment Facility
SFRA	Strategic Flood Risk Assessment
SGWMB	Scunthorpe & Gainsborough Water Management Board
SuDS	Sustainable Drainage Systems
TAG	Technical Advisory Group
TCPA	Town and Country Planning Act
UK	United Kingdom
WFD	Water Framework Directive

1. INTRODUCTION

- 1.1.1.1 This chapter of the Environmental Statement (ES) presents the findings of the assessment of likely significant effects on the water environment and flood risk as a result of the Project as described in Chapter 3.
- 1.1.1.2 The surface water environment as described in this chapter includes water quality, water resources, hydromorphology, flood risk, and drainage. Groundwater and hydrogeology are considered in Chapter 8: Ground Conditions, Contamination and Hydrogeology (**Document Reference 6.2.8**).
- 1.1.1.3 The potential for cumulative effects on the water environment, including flood risk, of the Project, is considered in Chapter 18 of the ES (**Document Reference 6.2.18**).

2. POLICY CONTEXT, LEGISLATION, GUIDANCE AND STANDARDS

- 2.1.1.1 A full review of the legislative and policy context that is relevant to the Project is presented in Chapter 2 of this ES (**Document Reference 6.2.2**).
- 2.1.1.2 A summary of the legislation and planning policy relevant to the assessment of potential effects on the water environment from the Project, and which have been taken into account in this assessment, is provided in this section.

2.2 Water Framework Directive

- 2.2.1.1 EU Directive 2000/60/EC established a framework for Community action in the field of water policy (the Water Framework Directive (WFD)). The overarching goal of the WFD is for relevant waters to reach "good" chemical and ecological status. Once good status is achieved, member states are then required to maintain this standard. Provided that certain conditions are satisfied, in some cases, the achievement of good status may be delayed until 2021 or 2027.
- 2.2.1.2 The WFD also sets goals for the progressive reduction of emissions, discharges and losses of Priority Substances and the cessation of Priority Hazardous Substances. As part of the WFDs aim to improve water quality the first priority substances list (Decision 2455/2001/EC) was issued by the European Commission, which identified 33 priority substances.
- 2.2.1.3 The Priority Substances Directive, a daughter directive of the WFD was introduced in 2008, which replaced the first priority substances list. In 2012, the European Commission put forward a proposal for a directive amending the WFD and the Priority Substances Directive regarding Priority Substances.
- 2.2.1.4 In the UK, a technical advisory group (WFD UKTAG) consisting of the UK environment and conservation agencies has been established to support the implementation of the WFD. The WFD UKTAG has established standards for certain substances that they consider are concentrations of a pollutant below which no harmful effects on aquatic organisms will be expected.

2.3 National Policy Statements

- 2.3.1.1 The Overarching Energy National Policy Statement (NPS) EN-1 explains the assessment principles to which the Secretary of State (SoS) will have regard in the examination of an energy NSIP (such as the Project) and explains the generic water quality and resources impacts with regard to energy infrastructure. Specific considerations for Energy from Waste (EfW) plants are provided in the NPS for Renewable Energy Infrastructure (EN-3). The NPS for Electricity Networks Infrastructure (EN-5) provides specific considerations potentially relevant to the Electrical Connection.
- 2.3.1.2 NPS EN-1 states, in Section 5.15, that "Infrastructure development can have adverse effects on the water environment including groundwater, inland surface water, transitional waters, and coastal waters." An

assessment of the existing conditions regarding water quality, water resources, and physical characteristics of the water environment and the impacts of a Project are required by paragraph 5.15.2.

- 2.3.1.3 NPS EN-1 notes that activities that discharge to the water environment are subject to additional pollution controls and recommends that the SoS gives increased weight to impacts on the water environment that will have an adverse effect on the achievement of the objectives of the WFD in its decision-making.
- 2.3.1.4 Paragraph 5.15.7 states that: "The [Secretary of State] should consider whether appropriate requirements should be attached to any development consent ... to mitigate adverse effects on the water environment."
- 2.3.1.5 NPS EN-3 Part 2 Section 2.3.3 states that: 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 the plant will be resilient to:
- increased risk of flooding; and
 - increased risk of drought affecting river flows.
- 2.3.1.6 Whilst Section 2.5.84 states: "Generic water quality and resource impacts are set out in Section 5.15 of NPS EN-1. The design of water-cooling systems for EfW and biomass generating stations will have additional impacts on water quality, abstraction and discharge".

2.4 Environmental Permitting Regulations 2016

- 2.4.1.1 The Environmental Permitting (England and Wales) Regulations 2007 sought to establish an integrated approach to Waste Management Licensing and Pollution Prevention and Control. In April 2010, the Environmental Permitting (England and Wales) Regulations 2010 increased the scope of the Environmental Permit to include water discharges and groundwater activities. In 2016, the regulations were updated again to consolidate a number of changes into one clear set of applicable legislation. More directly related to the water environment, these included a correction to allow the Canal and Rivers Trust and other statutory undertakers to be able to dredge without the need for a permit under a flood-risk activity scheme in England. This expands on the changes which replaced flood defence consents and brought flood risk activities into the environmental permitting regime on 6 April 2016.
- 2.4.1.2 The Environment Agency will control and regulate the Project with respect to the discharge of any effluent from the site via an Environmental Permit. The permit will include specific limits for a range of pollutants that could be present in any effluent proposed to be discharged to surface waters. These limits will be set to ensure that the process contribution of any pollutant within the scope of the WFD and the Environmental Quality Standards (EQS) Directive does not detrimentally affect the potential for the receiving water body to achieve good status.

2.5 Other National and Local Policy

- 2.5.1.1 Whilst the Planning Act 2008 (2008 Act) is clear as to the primacy of the relevant NPS, other national and local planning policy can be considered important and relevant by the SoS in the determination of an energy NSIP.
- 2.5.1.2 Paragraph 174 of the National Planning Policy Framework (NPPF) requires that the planning system should contribute to and enhance the natural environment by: “preventing new development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of...water...pollution.”
- 2.5.1.3 The NPPF also states (in paragraph 8) that the planning system should perform a number of roles in delivering sustainable development including an environmental role “contributing to protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution and mitigate and adapt to climate change including moving to a low carbon economy.”
- 2.5.1.4 The Core Strategy of the North Lincolnshire Local Development Framework (LDF) establishes that North Lincolnshire’s vision is to become the Global Gateway for the north between 2004 and 2026. The Core Strategy has 27 Core Policies, of which the most relevant to this chapter are:
- 2.5.1.5 Core Strategy Policy 19 - Flood Risk –states that:
- “The council will support development proposals that avoid areas of current or future flood risk, and which do not increase the risk of flooding elsewhere. This will involve a risk-based sequential approach to determine the suitability of land for development that uses the principle of locating development, where possible, on land that has a lower flood risk, and relates land use to its vulnerability to flood. Development in areas of high flood risk will only be permitted where it meets the following prerequisites:*
- It can be demonstrated that the development provides wider sustainability benefits to the community and the area that outweigh flood risk.*
- The development should be on previously used land. If not, there must be no reasonable alternative developable sites on previously developed land.*
- A flood risk assessment has demonstrated that the development will be safe, without increasing flood risk elsewhere by integrating water management methods into development.”*
- 2.5.1.6 Core Strategy Policy 20 - Sustainable Waste Management – which identifies Flixborough Industrial Estate as a site at which the Council will consider new and enhanced facilities for the treatment and management of waste.

2.5.1.7 Policy aims relating to water quality and water resources within the Core Strategy are also discussed in the separate Planning Statement (**Document Reference 5.1**) that accompanies the Application.

3. CONSULTATION

3.1.1.1 Consultation Table 1 and Table 2 below respectively present excerpts from the scoping opinion received from the Planning Inspectorate (PINS) and consultation responses on the PEIR specific to the Water Resources and Flood Risk assessment. The tables describe how each response has been or will be addressed by the Project, and, as appropriate where more information can be found in the ES.

Table 1: Scoping Consultation Responses

PINS ID	Issue	Inspectorate's comments	Response / Action	Reference within this document
10.4.1.4	Proposed to be scoped out of the EIA: Breach in, or reduction in the standard of flood defences	Sufficient information regarding the construction methods, design, or location of proposed quay extension has not been provided. Furthermore, the Scoping Report has not provided the location of the existing flood defences. Due to this lack of information, the Inspectorate does not agree that a potential breach, or reduction in the standard of flood defences can be scoped out of the ES.	The extension of the wharf (quay) is no longer part of the Project. Breach in the existing defences has been considered.	Chapter 3 – Project Description (Document Reference 6.2.3) and Annex 3- –Flood Risk Assessment (Document Reference 6.3.3)
10.7.1.8	Proposed to be scoped out of the EIA: Operational impact on water quality of the River Trent through operation of the proposed quay	Sufficient information pertaining to the operational activities, including number and type of vessel to use the proposed quay during operation of the Project is not provided. Furthermore, the Scoping Report has not provided evidence to support the assumption that the operation of proposed quay will not result in an increase in pollution to the River Trent. On this basis, the Inspectorate does not agree that this matter can be scoped out of the ES.	With the removal of the wharf extension from the Project and the limiting of vessels to an additional 2 per day, it has been agreed with the Environment Agency that a Water Framework Directive (WFD) compliance assessment is not required for the Project. The River Trent has been included as an assessed receptor.	Table 12 and Table 14

PINS ID	Issue	Inspectorate's comments	Response / Action	Reference within this document
10.7.1.17	Proposed to be scoped out of the EIA: Re-opening and operation of the disused rail spur	<p>Based on the implementation of the measures outlined within the Scoping Report Paragraphs 10.7.1.12 to 10.7.1.17, the Inspectorate agrees that no significant effects are likely to arise from the reopening and operation of the disused rail spur, and this matter can be scoped out of the ES.</p> <p>However, an assessment of potential hydrology, flood risk and water resources impacts associated with construction or maintenance works required to enable the re-opening and operation of the disused rail spur should be included within the ES.</p>	Potential impacts on the hydrology, flood risk and water resources from construction are included. Operational impacts have not been considered in this assessment.	Section 8.3
10.3.1.1	Baseline data sources	Data from the Lead Local Flood Authority (LLFA) should also be sought and used to inform the assessment.	The FRA has been developed in close consultation with the EA, LLFA and Local Drainage Board.	Annex 3 – Flood Risk Assessment (Document Reference 6.3.3)
10.4	Construction compounds	The potential impact of construction compounds on hydrology, flood risk and water resources should be included within the ES.	The potential impacts of construction compounds have been included in the assessment.	See Section 8
10.5; and Figure 10.5	Spatial Scope	The spatial scope of the assessment is to follow a proportionate approach that considers water receptors within hydraulic connection to the Project. If this approach is to be followed, the ES should provide evidence that the study area encompasses the full extent of potential impacts. In addition, the ES should provide a more detailed figure(s) of the study area than that depicted on Figure 10.1. The figure(s) within the ES should clearly show the surface waterbodies included within the assessment, as well as flood risk information such as surface water flooding, flood risk from sewers and groundwater. A figure(s) should also be provided depicting the area protected by flood defences.	A figure illustrating the spatial scope of the assessment is included in this Chapter.	See Figure 1 in Appendix A

PINS ID	Issue	Inspectorate's comments	Response / Action	Reference within this document
10.7.1.1	Sustainable Drainage Systems (SuDS)	The ES should outline any SuDS measures to be included within the design of the Project, setting out the location and dimension of SuDS elements.	A FRA has been undertaken based on the outline SuDS strategy for the Project.	Annex 3 –Flood Risk Assessment (Document Reference 6.3.3)
10.7.1.1	Flood plain	The ES should provide details of the size of the development to be construction (sic) within the River Trent flood plain, and explain how this loss of flood plain will be compensated.	The separate flood risk assessment details the scale of the development, assesses the impact that the new development has on surrounding areas and then provides details of how this is managed in-line with the requirements of the national planning policy framework (NPPF) and the Environment Agency (EA).	Annex 3 –Flood Risk Assessment (Document Reference 6.3.3)
N/A	Flood risk	The assessment within the ES should consider the flood risk from groundwater and sewers. To undertake the sewerage flood risk, the Applicant may find it prudent to consult with the relevant sewerage utility company.	The risks from groundwater flooding have been detailed in this Chapter, whilst risks from sewer flooding are presented in the flood risk assessment.	See Section 6.10.1.1 and Annex 3 –Flood Risk Assessment (Document Reference 6.3.3)
N/A	Methodology	The assessment methodology to be undertaken within the ES is not clearly set out within the Scoping Report. The ES should state the criteria used to set out the sensitivity of receptor, magnitude of impact and significance of effect. Effort should be made to consult on the assessment methodology with the relevant statutory consultation bodies.	The methodology to be undertaken is set out within this Chapter.	See Section 5

PINS ID	Issue	Inspectorate's comments	Response / Action	Reference within this document
N/A	Effects on Anglian Water network	Scoping response from Anglian Water Reference is made to potential for the permeation of water supply pipes from contaminants during the construction phase. It is important to ensure that adequate safeguards are put in place to ensure that the proposed energy park does not adversely affect the continued operation of Anglian Water's existing water supply infrastructure and assets. We would therefore advise that a specific risk assessment for the water mains supply network from contaminants should be undertaken by the applicant with the assistance of Anglian Water as water undertaker.	The Applicant will work with Anglian Water to undertake this risk assessment as a preconstruction activity under the CEMP.	CoCP (Annex 7) (Document Reference 6.3.7)
N/A	Abstraction of water	Scoping response from Environment Agency We note that Paragraph 3.2.9.1 states that "the DCO will include an application for an abstraction licence to supply water for the Project from a dedicated groundwater abstraction borehole during operation to be installed as part of the Project". If the applicant intends to abstract more than 20 cubic metres of water per day from a surface water source e.g. a stream or from underground strata (via borehole or well) for any particular purpose then they will need an abstraction licence from the Environment Agency. There is no guarantee that a licence will be granted as this is dependent on available water resources and existing protected rights – we would recommend the application undertakes early discussions with us in respect of this. It would also be helpful if the applicant could advise whether or not it is their intention to request disapplication of environmental legislation for this, under Section 150 of the 2008 Act.	The Project will source its water requirements during construction and operation from mains water supplies and will not now require a dedicated abstraction licence. The Applicant is not seeking to disapply environmental legislation.	N/A
10.7.1.7	Flood Risk Assessment	Scoping response from Environment Agency Paragraph 10.7.1.7 advises that the impact of flood risk from the River Trent will be addressed within a standalone flood risk assessment (FRA), which will be agreed in advance with the Environment Agency; this approach is welcomed. We are currently	The scope and approach to the flood risk assessment was developed further during the EIA process	Flood Risk Assessment (Annex 3)

PINS ID	Issue	Inspectorate's comments	Response / Action	Reference within this document
		working with the applicant to determine the scope and scale of the assessment required. The Scoping Report notes that modelling will be undertaken to establish the impact of the development on the extent and depth of floodwater both on and off site in the event of a breach of defences and overtopping scenarios. This should also include an assessment of the impact on the flood hazard rating, resulting from any changes to flood depth and velocities.	alongside consultation with the Environment Agency	
N/A	Construction near to flood defences	Scoping response from Environment Agency We also note the presence of a number of Environment Agency maintained flood defences within close proximity to the development. The full extent of the interactions between the development and the existing flood defences is still being established. However, at this stage the applicant should note that we will require a buffer of 16m between our existing defences and any built development resulting from this application. This is to ensure our future access to those defences for inspection, maintenance and potential "topping up" improvements, which may be required in response to climate change.	Consideration of this has been made as part of the ongoing design	Chapter 3 (Document Reference 6.2.3) and design drawings accompanying the DCO application
N/A	Construction near to flood defences	Due to the proximity of the development to the River Trent and the existing flood defences, the construction works associated with the development will require our approval under the Environmental Permitting Regulations 2016. We will need to discuss this in more detail as the application evolves to determine the most appropriate mechanism to safeguard flood defence assets. This is sometimes done through the inclusion of Protective Provisions within a Development Consent Order (if we agree to the disapplication of environmental legislation under Section 150 of the Planning Act 2008) or we may choose to retain the requirement for a separate Flood Risk Permit application. However, as works to the defences also appear to be being proposed, i.e. extending the wharf/quay,	The Applicant is no longer extending the wharf and intends to apply for a separate Flood Risk Permit.	

PINS ID	Issue	Inspectorate's comments	Response / Action	Reference within this document
		this may need to be captured within a separate Legal Agreement between the applicant and the Environment Agency.		

3.1.1.2 Table 2 below sets out the key stakeholder comments from the pre-application statutory consultation specific to water resources and flood risk. The table describes how each response has been or will be addressed by the Project. Responses have been included when they are directly relevant to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the Infrastructure EIA Regulations 2017), have required a technical clarification and / or further impact assessment. The full set of responses is contained in the Consultation Report (**Document Reference: 7.1 Appendix I-1**).

3.1.1.3 The consultee types for the purposes of statutory consultation under the 2008 Act are as follows:

- s42(a) is with prescribed consultees;
- s42(b) is with local authorities;
- s44 is with consultees with an interest in land; and
- s47 is with the local community.

Table 2 Pre-application Consultation Responses

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
S42(a)	Environment Agency	The approach outlined in this chapter (8) to assess risks to the water environment appears satisfactory with additional work planned in relation to establishing the land contamination situation. We would like to emphasise that ditches provide vital connecting habitat that delivers for climate change resilience and culverting should be avoided wherever possible. Where it is	The aim of the Indicative Drainage Strategy in Annex 5 of the Environmental Statement (Document Reference 6.3.5) is to minimise the impact on existing ditches. Culverts will be required for ditches crossing beneath the new access road within the Energy Park Land. However, culverting existing drainage ditches will be avoided where possible. Where	Chapter 10

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
		unavoidable, suitable measures to mitigate against adverse impacts on all watercourses should be provided in the EIA. This extends to their geomorphological properties and habitat in addition to those associated with water quality.	ditches are being diverted, piped/culverted sections will be kept to a minimum. Chapter 10: Ecology and Nature Conservation of the Environmental Statement (Document Reference 6.2.10) includes pollution prevention measures for working close to and within watercourses, to ensure pollution caused by siltation and fuel/chemicals is avoided. Precise methodology for temporary crossings along the southern district heat network ditches will vary.	
S42(a)	Environment Agency	In response to the Planning Inspectorate's comments that the Scoping Report has not provided evidence to support the assumption that the operation of the proposed quay will not result in an increase in pollution to the River Trent and therefore disagrees that this matter can be scoped out of the Environmental Impact Assessment (EIA), you have responded by saying "it has been agreed with the Environment Agency that a Water Framework Directive (WFD) compliance assessment is not required for the Project". Discussions around the need for a WFD compliance assessment were based upon the physical footprint of the works, which have been amended since the initial publication of the Scoping Report so that extension of the wharf and requirement to abstract from the river no longer forms part of the proposed development. On this basis, it was agreed that a WFD compliance	Winterton Beck is the only Water Framework Directive waterbody with hydraulic connection to any of the proposed works. This water body will not be directly affected by any physical works and will not be affected by any construction or operational aspects of the Project that could affect its water quality. The Project does not include any new direct surface water discharge connections to Winterton Beck or the River Trent. SuDS will be used to manage surface water runoff and new wetlands will help improve the water quality before discharge to Lysaght drain and pumped to the River Trent. The proposed flood risk mitigation measures do not have direct impact to existing watercourses or Water Framework Directive waterbodies. As set out in the Consents and Licenses Document (Document Reference 5.8), any construction activities proposed near a watercourse or existing flood defence will obtain the relevant Environmental Permit before commencement of works. This will	Consents and Licenses Document

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
		assessment was no longer required for the physical development. This does not preclude the need for a WFD compliance assessment should there be potential for significant discharge or pollution to any receiving waterbody as part of the operation of the proposed development. Should there be likely significant impacts on the water quality of any receiving waterbody, an assessment may still be required. We strongly recommend that drainage systems to collect on-site surface water runoff are designed and maintained in a way which enhance biodiversity and actively improves the water quality.	demonstrate preventative measures that will be put in place to reduce potential pollution.	
S42(a)	Environment Agency	Park Ings Store: This property is located at grid reference SE8633113749, it is not explicitly referred to within the flood risk assessment (FRA) but the location does appear to be impacted significantly during the range of flood events modelled. Could you please confirm if this property will be removed as part of the development proposals? If the property will remain post development, the site specific flood risks will require further investigation and mitigation may be necessary.	The building at grid reference SE8633113749 is planned to be removed as part of the development. Therefore, site specific flood risks and mitigation will not be required.	N / A

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
S42(a)	Environment Agency	Detailed Design: We are supportive of the general design principles for the development outlined within the FRA and, when appropriate, the final design should confirm that: the development is able to remain operational during the design flood event; finished floor levels for all buildings and essential equipment within the development are raised above the design flood event, including climate change and appropriate freeboard; access and egress is available to and from the proposed development during a design flood (Planning Practice Guidance, ID: 7-039-20140306).	Development levels and equipment levels will be set above the design flood event (DFE) level with allowance for freeboard and climate change to ensure the site remains operational during the DFE. Likewise, safe access and egress routes will be set above the DFE. This information is available as part of the Flood Risk Assessment in Annex 3 of Chapter 3: Project Description of the Environmental Statement (Document Reference 6.3). Further modelling during the detailed design stage post planning will confirm culvert sizes to provide sufficient capacity with sensitivity tests undertaken to understand impacts of blockage. Maintenance plans will also be developed at the detailed design stage to ensure appropriateness of measures, as per requirements written by the Environment Agency.	Chapter 3, Annex 3
S42(a)	Environment Agency	The detailed design of the culverts conveying flood flows beneath the raised road should demonstrate that there is sufficient capacity to convey flows and include appropriate levels of freeboard where necessary. It may also be necessary to undertake an assessment of the impact of blockage of the culverts to understand the impact on flood risk. Flood Risk Mitigation Measures: The flood risk mitigation measures proposed are essential to ensure that the scheme does not increase flood risk to third parties and the appropriateness of the scheme rests on the successful functioning of these measures.	An Environmental Permit will be applied for before construction once construction methodologies are developed in future stages.	N / A

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
		Therefore confirmation of the long term ownership, and having a robust maintenance plan in place to ensure these measures function as designed for the lifetime of the development is critical to ensure that the development is safe and doesn't increase flood risk to others. Flood Risk Activity Permit: The Environmental Permitting (England and Wales) Regulations 2016 require a permit or exemption to be obtained for any activities which take place within 16m of a flood defence on a Tidal Main River or for activities which are likely to divert or obstruct flood waters from Main River, this may include the defences constructed as part of the schemes flood risk mitigation measures.		
S42(a)	Humberside Fire and Rescue	Adequate provision of water supplies for fire fighting appropriate to the proposed risk should be considered. If the public supplies are inadequate it may be necessary to augment them by the provision of on-site facilities. Under normal circumstances hydrants for industrial unit and high risk areas should be located at 90m intervals. Where a building, which has a compartment of 280m ² or more in the area is being, erected more than 100m from an existing fire hydrant, hydrants should be provided within 90m of an entry point to the building and not more than 90m apart. Hydrants for low risk and	The Project will comply with the relevant National Fire Protection Association (NFPA) codes and standards. The Energy Recovery Facility will be equipped with a fire water tank sized in excess of the minimum requirements of NFPA 850. The spacing between hydrants will not exceed the distance specified in BS9990 (90m). The distance from a fire hydrant to a building shall not be closer than that specified in NFPA 24 (12m).	N / A

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
		residential areas should be located at intervals of 240m.		
S42(a)	Natural England	<p>It is understood that all water for use within the proposed development will be sourced from the Anglian Water mains supply, and all elements will be connected into a surface water drainage system and a sewerage system.</p> <p>Natural England welcomes mitigation measures proposed in Chapter 9, Section 7, as well as mitigation to prevent leaching of construction pollutants into surface waters, as outlined in Chapter 9, paragraph 8.2.1.9. Potential for water quality impacts should be considered in the HRA.</p>	<p>This is noted. The HRA, set out in the Report to inform the Habitats Regulations Assessment (Document Reference 5.9) considers the potential for impacts on water quality.</p>	N / A
S42(a)	Scunthorpe & Gainsborough Water Management Board	<p>The Board is an independent public authority and drainage authority constituted under the Land Drainage Act; operating under the Land Drainage Act 1991 (as amended) and is a Risk Management Authority under the Flood & Water Management Act 2010. All developments planning work in, on, under or near ordinary watercourses (including piped ordinary watercourses), or discharging surface water into a watercourse within the defined Drainage District require CONSENT from the Board under the Land Drainage Act 1991 (as amended) in addition to, or as part of, any Planning Permission. The Key Constraints for any Development near any Watercourse</p>	<p>This is noted. The proposed surface water drainage strategy, set out in the Indicative Drainage Strategy in Annex 5 of the Environmental Statement (Document Reference 6.3.5) and the flood mitigation measures as set out in the Flood Risk Assessment (Document Reference 6.3.3) have been designed to include Scunthorpe & Gainsborough Water Management Board's requirements.</p>	N / A

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
		<p>within the Drainage District can be summarised as follows:</p> <ul style="list-style-type: none"> ■ No obstructions above ground within 9 metres of the edge of a watercourse bank top ■ No increase in surface water discharge rate or volume (or restricted to 1.4 litres per second per hectare) ■ No obstruction to flow within a watercourse (caused by structures etc.) ■ Similar Constraints apply to Main River within the Drainage District but as defined by the Environment Agency under Applications for Permits. 		
S42(a)	Scunthorpe & Gainsborough Water Management Board	<p>If any Development proposes to work in, on, under or near ordinary watercourses (including piped ordinary watercourses), or create or alter surface water discharge into a watercourse then the following Consents would be required from the IDB:</p> <p>Section 23 Consent Section 23 LDA prohibits obstructions etc. in watercourses and states “no person shall erect any mill dam, weir or other like obstruction [or] erect any culvert that would be likely to affect the flow of any watercourse ... without the consent in writing of the drainage board concerned.”</p> <p>Section 66 (Byelaw) Consent</p>	<p>This is noted. Section 23 and Section 66 consents will be applied for from Scunthorpe & Gainsborough Water Management Board (SGWMB) for future stages of the Project. This is referred to in the Consents and Licenses Document (Document Reference 5.8)</p> <p>The current strategy, as discussed with SGWMB, is to discharge to ordinary watercourse across the development site. In all cases surface water discharge will be restricted to 1.4l/s/ha.</p>	Consents and Licenses Document

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
		<p>Section 66 LDA provides the power to make byelaws which state that “no person shall ... introduce any water into any watercourse in the District so as to directly or indirectly increase the flow or volume of water ... without the previous consent of the Board [and] no person ... shall erect any building or structure whether temporary or permanent, or plant any tree, shrub, willow ... without the previous consent of the Board, amongst other byelaws specific to each IDB which can be found https://www.shiregroup-idbs.gov.uk/planning-consents-2/</p> <p>Consent Applications will be determined by the IDB under the Land Drainage Act 1991 (as amended), require both temporary and permanent works applications and the IDB has a statutory 2 month determination period from the day on which the application is made or when the application fee (£50 per application or as prescribed) is discharged, whichever is later.</p> <p>Every person who acts in contravention of, or fails to comply with, any notice served under Section 24 LDA or Byelaws under Section 66 LDA shall be guilty of an offence and liable, on summary conviction to such fines as prescribed within Section 24(3) and/or Section 66(6) LDA.</p>		

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
		<p>Consent Applications can be found on the website https://www.shiregroup-idbs.gov.uk/planning-consents-2/ and sent to consents@shiregroup-idbs.gov.uk</p> <p>The IDB standard planning response advice is as follows:</p> <ul style="list-style-type: none"> ■ If the surface water were to be disposed of via a soakaway system, the IDB would have no objection in principle but would advise that the ground conditions in this area may not be suitable for soakaway drainage. It is therefore essential that percolation tests are undertaken to establish if the ground conditions are suitable for soakaway drainage throughout the year. ■ If surface water is to be directed to a mains sewer system the IDB would again have no objection in principle, providing that the Water Authority are satisfied that the existing system will accept this additional flow. ■ If the surface water is to be discharged to any ordinary watercourse within the Drainage District, Consent from the IDB would be required in addition to Planning Permission, and would be restricted to 1.4 litres per second per hectare or greenfield runoff and no increase in volume. ■ No obstructions within 9 metres of the edge of an ordinary watercourse are permitted without Consent from the IDB. 		

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
S42(b)	North Lincolnshire Council	<p>The Council's Drainage team has reviewed Chapter 9 of the PEIR and have raised no objection to the proposed method of assessing flood risk and is happy that an acceptable level of SuDS measures are proposed.</p> <p>The Drainage officer has further confirmed that detailed discussions have taken place with the developers team and that the only outstanding area of concern is the blocking of the culvert under the A1077. It is understood that the modelling and strategy is being revised accordingly to demonstrate that this will not result in flooding to the downstream catchment. On this basis I have no further comments to make at this time.</p>	<p>This is noted. The flood mitigation strategy has been revised to avoid reducing the size of the culvert under Ferry Road West (A1077/B1216).</p>	N / A
S44	AB Agri	<p>The PEIR indicates that the flood risk arising from the proposed scheme will require mitigation, including the construction of a new earth bund on the west and south section of the AB Agri site. However, other than the estimated measurement of the required bund (which is extensive), the PEIR suggests that the bund design will only be developed further in the detailed design phase. Aside from the issue of the earth bund proposed being within the AB Agri site, the lack of the bund details means that we cannot ascertain the impact on ABN (including future maintenance of their existing building and ability for this to be</p>	<p>The flood model has been revised since the PEIR submission and the defences proposed around the AB Agri site have been reviewed given the specific constraints in this area. The defences themselves are intended to provide protection under a breach scenario and the main protection is actually to provide protection to the AB Agri site. They could be removed and replaced with a flood evacuation plan, however there is still a risk to the property. Therefore, it is proposed to retain the defences, albeit adjust the design to include walls instead of bunds along specific sections. Construction of the flood wall will only require temporary access and no permanent land take.</p>	N / A

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
		extended). Based on Figure 2 of the PEIR Chapter 3 and information provided in the Draft Flood Risk Assessment (FRA), the proposed bund/flood mitigation will necessitate the blocking off of the existing tertiary access/egress point to the AB Agri site, which is not acceptable to us. Furthermore, based on the estimated size of the bund, it will require a considerable land take and there is no information to assess feasibility. We therefore request an alternative to the proposed earth bund within the AB Agri site or further clarity relative to the extent of the bund and its design be shared with us for our review.	Furthermore, the legality and claim to the tertiary access to the port area has been refuted by RMS Ports and no legal title has been provided by #S44.8 to establish a legal right to this access. It is suggested that the Applicant sponsor a discussion with RMS Ports to resolve this between the parties.	
S44	AB Agri	<p>The FRA assesses the impact of the development over a 40 year lifetime (565mm sea level rise allowance 2065).</p> <p>To assess the residual risk a sensitivity test has also been carried out by Buro Happold with a higher climate change estimate (572.5mm 2065). To protect the development plots from the flooding, it is proposed to raise ground levels or provide secondary flood defences. At the end of the 40year lifetime it is likely that these measures would still be in place and influence flooding beyond 2065. Therefore, the proposed development should be tested in the design flood events with a 2125 climate change allowance (1150mm sea</p>	Under this scenario, it is our assumption using data provided by the Environment Agency that the site will be inundated during both overtopping and under a river bank flood defence breach scenario both with and without the proposed development. It would not therefore be beneficial to model and assess the impact in 2125 as the Environment Agency and North Lincolnshire Council are likely to undertake significant changes in flood risk management in this area over the next 40 years and therefore an assessment undertaken now will not be reflective of the impact in 2125. The flood modelling undertaken to date indicates that during significant increases in sea level rise, the AB Agri site will likely be affected due to overtopping of the existing defences north of the port. With the	N / A

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
		level rise allowance 2125) in order to understand the impact of the measures on the AB Agri site.	<p>development in place, no significant increase in the flood risk to the AB Agri site is foreseen. It is intended that following the design life of the NLGEP development, the site will be returned to its existing use. Discussions on retaining secondary defences can be made with relevant parties closer to the decommissioning date once future proposals of the main flood defences in the area are better known.</p> <p>Where possible effects of decommissioning on environmental factors have been assessed as part of the application, but best practice, technology and methods to be used in the decommissioning process may have changed considerably by 2065. Therefore, the DCO will contain a requirement which acknowledges this and requires a site closure and restoration scheme or Decommissioning Plan containing details of the phasing of demolition works and removal of materials to be submitted to and approved by the relevant planning authority. It is at this stage that the Applicant will consider in more detail the environmental impacts of decommissioning, including impacts on flood risk.</p>	

Consultee type	Consultee	Consultee's comments	Response / Action	Reference within this document
S44	AB Agri	It is also considered that a sensitivity test should be undertaken in order to assess a potential worst-case scenario, with a breach of the River Trent defences located immediately south west of the AB Agri site	Breach testing south of the port has been carried out as agreed with the Environment Agency. This is directly next to the ERF plant and where the location of the plant will have greatest impact to surrounding areas. Ground levels are also lower in this location compared to north of the port and therefore allows the impact of displacement of a greater volume of water in the area to be assessed.	N / A
S47	Local Community	The flood risk is high within the lifetime of the Project and I ask how 'building on a flood plain' is a good investment when it has been said it will flood within the next 30 years and the low lying land unsalvageable within 50 years.	The area is currently protected by flood defences. In the future, the development - including access - has been designed to sit above the extreme tidal 1 in 200yr (plus allowance for climate change) flood level, including scenarios in which the flood levels are breached. Additional to this, the development has been designed to not increase flood risk elsewhere.	N / A
S47	Local Community	You acknowledge that being in a designated Flood Zone 3 area, parts of the development are at a high risk of flooding. Residents need to be assured that any mitigation measures will literally 'hold water'. Concerns about your project displacing floodwater north of Ferry Road West and increasing surface water runoff area at the forefront of people's minds and are causing great concern.	The Flood Risk Assessment (FRA), set out in Annex 3 of the Environmental Statement (Document Reference 6.3.3) takes into account potential increases in flood risk to areas outside of the proposed development and incorporates flood mitigation measures to ensure the risk is not increased to others.	N / A

4. ASSESSMENT PARAMETERS

- 4.1.1.1 The parameters of the Project used for the basis of assessment include the construction, operation and decommissioning effects, on a reasonable worst-case basis as set out in Chapter 3 of the ES (**Document Reference 6.2.3**).
- 4.1.1.2 In the case of effects on water resources and flood risk, the worst-case scenario relates to the maximum footprint parameters for the Project design envelope and maximum indicative laydown areas, within their limits of deviation as presented in Table 1 of Chapter 3 (**Document Reference 6.2.3**).
- 4.1.1.3 The assessment considers the potential effects of the worst-case Project parameters on the surrounding:
- watercourses (rivers and streams);
 - water resources (water abstraction, discharges, and availability); and
 - flooding.
- 4.1.1.4 Where limits of deviation incorporate water receptors, the assessment is undertaken on the basis that the receptor will be directly affected, and in doing so, will identify where mitigation will be required or where direct effects will result in significant effects that could not be mitigated.

5. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

5.1 Study area

- 5.1.1.1 For the purposes of the water resources and flood risk assessment, the study area has been defined to incorporate all watercourses and water bodies that are in hydraulic connection with the Application Land. The approach provides a proportionate alternative to a generic radius which will inevitably include waterbodies in a location uphill hydraulically disconnected from the development which could not be affected. Figure 1 in Appendix A shows all the watercourse and receptors in hydraulic connection with the Application Land and thus defines the study area for the assessment.
- 5.1.1.2 Given the size and length of the River Trent, it is unlikely that any further waterbodies downstream could be affected and thus, as presented in the Scoping Report, the confluence of the River Trent and the Humber Estuary is considered the furthest downstream limit of the study area.
- 5.1.1.3 The study area for the consideration of flood risk has been defined based on detailed hydraulic modelling undertaken in conjunction with the LLFA and Environment Agency, and is limited to areas where the Project has the potential to increase flooding during the 0.5% annual exceedance probability (AEP) flood event¹.
- 5.1.1.4 Secondary effects may occur on other water receptors outside of the study area through increased demand by the Project for potable water supplies and foul water treatment.
- 5.1.1.5 Where emissions from the Project have the potential to affect water receptors, the spatial extent of these receptors is defined by the study area for the Air Quality Assessment (**Document Reference 6.2.5**).
- 5.1.1.6 Modelling for the Project has been undertaken to determine the potential for atmospheric deposition of NO_x and ammonia releases from the ERF and CCS plants respectively. Deposition from these emissions on water receptors is assessed against critical levels set for each particular receptor. The significance of effects relating to atmospheric deposition to these sites is reported in Chapter 5 of the ES (**Document Reference 6.2.5**) and Chapter 10 (**Document Reference 6.2.10**).

5.2 Assessment methodology

- 5.2.1.1 The methodology adopted for the assessment of effects of the Project on the water environment adopts the following approach:
- estimation of the magnitude of the impact,
 - estimation of the importance of the receptor and its sensitivity to the impact concerned, and

¹ As required by the National Planning Policy Framework (NPPF)

- assessment of the significance of the impact based on the magnitude of the impact and the importance/sensitivity of the receptor.

5.2.1.2 The approaches used to estimate the importance/sensitivity of water environment receptors and the magnitude of the impact are provided in Table 3 and Table 4 below. The approach used to assess the significance of effects is shown in

5.2.1.3 Table 5.

Table 3: Estimating the importance / sensitivity of Water Receptors

Importance / sensitivity of receptor	Criteria	Examples
Very High	Nationally significant attribute of high importance / sensitivity	Watercourse with a Q95flow ² \geq 1.0 m ³ /s, essential infrastructure or highly vulnerable development ³
High	Locally significant attribute of high importance / sensitivity	Watercourse with a Q95flow < 1.0m ³ /s, more vulnerable development
Moderate	Of moderate importance / sensitivity	Watercourses with no permanent base flow, less vulnerable development
Low	Lower importance / sensitivity	Surface water or agricultural drain, water compatible development

² Q95 (the 5-percentile flow): The flow in cubic metres per second which was equalled or exceeded for 95% of the flow record.

³ as defined in Table 2 of the Flood Risk section of the Technical Guidance to the NPPF.

Table 4: Magnitude of potential impact

Magnitude of potential impact	Criteria	Examples
Large	Results in loss of attribute and / or quality and integrity of the attribute	<p>Loss or extensive change to a fishery / designated Nature Conservation Site.</p> <p>Loss of or extensive change to designated wetlands.</p> <p>Change to the environmental status/classification of a water feature, including water quality classification.</p> <p>Changes to site resulting in an increase in discharge/runoff of > 75% with flood/sewerage exceedance potential.</p> <p>Increase in peak flood level (1% annual probability event (ape)) > 100mm.</p> <p>Loss of flood storage areas.</p> <p>Increase in potable demand beyond that which can be supplied by existing infrastructure or by upgrade works to existing infrastructure within vicinity of development.</p>
Medium	Results in effect on integrity of attribute, or loss of part of the attribute	<p>Partial loss or change to a fishery / designated Nature Conservation Site. Loss in the productivity of a fishery.</p> <p>Partial loss or change to designated wetlands.</p> <p>Pollution of a receiving water body, but insufficient to change the environmental status/classification, including water quality classification.</p> <p>Changes to site resulting in an increase in discharge/runoff within system capacity.</p> <p>Changes to site resulting in an increase in discharge/runoff of > 50% with flood/sewerage exceedance potential.</p> <p>Increase in peak flood level (1% ape) > 50mm.</p> <p>Increase in potable demand beyond that which can be supplied by existing infrastructure, but which can be met with moderate upgrade works to existing infrastructure within vicinity of development.</p>
Small	Results in some measurable change in attributes, quality or vulnerability	<p>Potential low risk of some pollution to a surface water body, but insufficient to cause loss in quality, fishery productivity or biodiversity.</p> <p>Minor effects on water supplies.</p>

Magnitude of potential impact	Criteria	Examples
Negligible ⁴	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity	The proposed project is unlikely to affect the integrity of the water environment. Negligible change to peak flood level ($\leq \pm 10$ mm).

Table 5: Significance of effects

Importance / sensitivity of receptor	Magnitude of Impact			
	Negligible	Small	Medium	Large
Very High	Negligible - Not significant	Moderate adverse – significant	Major adverse - significant	Major adverse - significant
High	Negligible - Not significant	Moderate adverse – significant	Moderate adverse – significant	Major adverse - significant
Medium	Negligible - Not significant	Minor adverse – not significant	Moderate adverse – significant	Moderate adverse – significant
Low	Negligible - Not significant	Negligible - Not significant	Minor adverse – not significant	Minor adverse – not significant

⁴ Impacts of negligible magnitude will not lead to likely significant effects

6. BASELINE AND RECEPTORS

6.1 Water courses

- 6.1.1.1 As presented in Figure 2, based on the Environment Agency's catchments Data Explorer, the Application Land fall within three separate surface water sub-catchments of the River Trent and Humber Estuary. These are the Bottesford Beck, Winterton Beck, and the River Trent catchments respectively.
- 6.1.1.2 Within these catchments, there are a large number of watercourses that are hydraulically connected to the Project. However, the Winterton Beck is the only WFD waterbody to be in direct hydraulic connection, with all other waterbodies being classed as artificial, agricultural, or internal drainage board (IDB) controlled land drains.
- 6.1.1.3 Although the River Trent is located directly to the west of the Project, there will be no construction, operational, or decommissioning interactions with the River Trent, except for a minor increase in the number of vessels visiting the Flixborough Wharf (up to two per day).
- 6.1.1.4 With regards to the Bottesford Beck, the Project will only marginally cross into the catchment of this watercourse where the District Heating and Private Wire Networks (DHPWN) run south and west towards the M180 and Scunthorpe centre respectively. At its closest point, the DHPWN will be over 2.5km from the Bottesford Beck. For this reason, and the lack of hydraulic connection between the Project and the watercourse, the Bottesford Beck is not considered further in this assessment.
- 6.1.1.5 Table 6 below, presents all the waterbodies within hydraulic connection with the Project and their waterbody type. The location of these waterbodies in relation to the Application Land is shown in Figure 1.

Table 6: Waterbodies within hydraulic connection and their waterbody type

Receptor Name	Waterbody type	Hydraulic connection and interaction with the Project	Importance / sensitivity
River Trent	Main River	No direct physical connection but downstream of the Project.	Very High
Winterton Beck	Main River	No direct physical connection but downstream of the Project.	High
Winterton Beck Tributary 1	Agricultural Drain	Passes beneath the route of the railway line.	Low
Winterton Beck Tributary 2	Agricultural Drain	Passes beneath the route of the railway line.	Low
Winterton Beck Tributary 3	Agricultural Drain	Passes beneath the route of the railway line.	Low
Burton and Flixborough Drain	IDB Maintained	No direct physical connection but downstream of the Project.	Low
Burton and Flixborough Drain Tributary 1	Agricultural Drain	No direct physical connection but downstream of the Project.	Low
Burton and Flixborough Drain Tributary 2	Agricultural Drain	Passes beneath the route of the railway line.	Low
Burton and Flixborough Drain Tributary 3	Agricultural Drain	Passes beneath the route of the railway line.	Low
Burton and Flixborough Drain Tributary 4	Agricultural Drain	Passes beneath the route of the railway line.	Low
Lysaght's Drain	IDB Maintained	Within the Application Land and crossed by the proposed main access road.	High
Lysaght's Drain Tributary 1	Agricultural Drain	Within the Application Land but with no direct interaction with construction or operational works. Located on land reserved for flood management.	Low
Lysaght's Drain Tributary 2	Agricultural Drain	Within the Application Land but with no direct interaction with construction or operational works. Located on land reserved for flood management.	Low
Lysaght's Drain Tributary 3	Agricultural Drain	Within the Application Land but with no direct interaction with construction or operational works. Located on land reserved for flood management.	Low
Lysaght's Drain Tributary 4	Agricultural Drain	Within the Application Land and to be crossed by the temporary flood bund construction road.	Low

Receptor Name	Waterbody type	Hydraulic connection and interaction with the Project	Importance / sensitivity
Lysaght's Drain Tributary 5	Agricultural Drain	Within the Application Land but with no direct interaction with construction or operational works. Located on land reserved for flood management.	Low
Lysaght's Drain Tributary 6	Agricultural Drain	Within the Application Land and to be crossed by the temporary flood bund construction road.	Low
Lysaght's Drain Tributary 7	Agricultural Drain	Within the Application Land but with no direct interaction with construction or operational works. Located on land reserved for flood management.	Low
Lysaght's Drain Tributary 8	Agricultural Drain	Within the Application Land and crossed by the main access road.	Low
Lysaght's Drain Tributary 9	Agricultural Drain	Within the Application Land and to be incorporated into the SuDS / Wetland area to the west of the main access.	Low
Lysaght's Drain Tributary 10	Agricultural Drain	Within the Application Land and to be incorporated into the railhead and concrete block manufacturing.	Low
Lysaght's Extension	IDB Maintained	Within the Application Land but with no direct interaction with construction or operational works. Located on land reserved for flood management.	Low
Ferry Road West Drain	IDB Maintained	Within the Application Land and crossed by the main access road.	Low
Neap House Drain	IDB Maintained	Within the Application Land but with no direct interaction with construction or operational works. Located on land reserved for flood management.	Low
Neap House Drain Tributary 1	Agricultural Drain	No direct physical connection but downstream of the Southern DHPWN.	Low
Neap House Drain Tributary 2	Agricultural Drain	No direct physical connection but downstream of the Southern DHPWN.	Low
Neap House Drain Tributary 3	Agricultural Drain	Within the Application Land and crossed by the Southern DHPWN.	Low
Jaque's Drain	IDB Maintained	No direct physical connection but downstream of the Southern DHPWN.	Low
Jaque's Drain Tributary 1	Agricultural Drain	No direct physical connection but downstream of the Southern DHPWN.	Low
Jaque's Drain Tributary 2	Agricultural Drain	No direct physical connection but downstream of the Southern DHPWN.	Low
Jaque's Drain Tributary 3	Agricultural Drain	No direct physical connection but downstream of the Southern DHPWN.	Low
Jaque's Drain Tributary 4	Agricultural Drain	No direct physical connection but downstream of the Southern DHPWN.	Low
Guinness House Drain	IDB Maintained	No direct physical connection but downstream of the Southern DHPWN.	Low

Receptor Name	Waterbody type	Hydraulic connection and interaction with the Project	Importance / sensitivity
Brumby Sewer	Artificial agricultural land drain	Within the Application Land and crossed by the Southern DHPWN.	Low
Earl Beauchamp's Warping Drain	IDB Maintained	Within the Application Land and crossed by the Southern DHPWN.	Low
Unnamed Drain 1	Agricultural Drain	Within the Application Land and crossed by the Southern DHPWN.	Low
Unnamed Drain 2	Agricultural Drain	Within the Application Land and crossed by the Southern DHPWN.	Low
Unnamed Drain 3	Agricultural Drain	Within the Application Land and crossed by the Southern DHPWN.	Low
Unnamed Drain 4	Agricultural Drain	Within the Application Land and crossed by the Southern DHPWN.	Low
Unnamed Drain 5	Agricultural Drain	Within the Application Land and crossed by access to construction compound.	Low
Unnamed Drain 6	Agricultural Drain	Within the Application Land and crossed by the Southern DHPWN.	Low
Unnamed Drain 7	Agricultural Drain	No direct physical connection but downstream of the Southern DHPWN.	Low
Unnamed Drain 8	Agricultural Drain	No direct physical connection but downstream of the Southern DHPWN.	Low
Unnamed Drain 9	Agricultural Drain	No direct physical connection but downstream of the Southern DHPWN.	Low
Unnamed Drain 10	Agricultural Drain	No direct physical connection but downstream of the Southern DHPWN.	Low
Unnamed Drain 11	Agricultural Drain	Within the Application Land and crossed by the Southern DHPWN.	Low
Unnamed Drain 12	Agricultural Drain	Within the Application Land and crossed by the Southern DHPWN.	Low
Unnamed Drain 13	Agricultural Drain	Within the Application Land and crossed by the Southern DHPWN.	Low
Unnamed Drain 14	Agricultural Drain	Within the Application Land and crossed by the Southern DHPWN.	Low
Unnamed Drain 15	Agricultural Drain	Within the Application Land and crossed by the railway line laydown area.	Low

6.2 Water resources

6.2.1.1 The following information highlights the details of water activity permits, water abstractions, and past pollution incidents based on information provided by the Landmark Information Group Envirocheck report (Envirocheck, 2020; Landmark, 2020).

6.2.2 Surface water discharge

6.2.2.1 Table 7 presents the details of all active surface water discharge permits within 1km of the Application Land, seven of which are in hydraulic connection of the Application Land. Those active permits within hydraulic connections are presented in **bold** in Table 7 and in Figure 3.

6.2.2.2 The consented discharges are for a range of uses, including public storm sewage overflows, sewage discharges (both water and non-water companies), and treated sewage effluent. The majority of these licences belong to Severn Trent Water Limited, but there are also a small number of residential and non-water company licences.

Table 7: Active Water discharge permits within 1km of the Order Limits

Map ID	Within Hydraulic Connection	Licence	Distance from site (m)	OS Grid Reference	Issue date	Discharge type	Receiving water
1	Out	T/81/00909/O	542	SE8680010000	29th January 1962	Public sewage: storm sewage overflow	Tributary of River Trent (Tidal)
2	Out	T/81/40050/O	678	SE8713009280	14th February 1995	Sewage discharges - pumping station - water company	Westcliff Balancing Lagoon
3	Out	T/84/07794/O	401	SE8680011430	8th May 1981	Storm /emergency overflow	Neap House Drain
4	Out	T/84/07794/O /2	403	SE8680011425	8th May 1981	Sewage effluent discharge-storm effluent	Neap House Drain
5	Out	Eprhb3991az	407	SE8680511428	22nd November 2018	Public sewage: storm sewage overflow	Neap House Drain
6	Out	Eprhb3990wt	407	SE8680511428	9th August 2018	Public sewage: storm sewage overflow	Crosby Catchwater Drain
7	Out	CT/84/07794/O3	408	SE8680511425	8th May 1981	Sewage effluent discharge-storm effluent	Neap House Drain
8	Out	T/81/00448/O	480	SE8700011700	9th October 1957	Discharge of other matter-surface water	Tributary of River Trent (Tidal)
9	Out	T/81/00448/O	597	SE8700011400	30th March 2011	Sewage discharges - pumping station - water company	Tributary of River Trent (Tidal)
10	Out	T/81/00241/O /3	689	SE8710011400	10th March 1955	Sewage effluent discharge-storm effluent	River Trent (Tidal)
11	Out	T/81/00241/O /1	691	SE8710011395	10th March 1955	Sewage effluent discharge-storm effluent	River Trent (Tidal)

Map ID	Within Hydraulic Connection	Licence	Distance from site (m)	OS Grid Reference	Issue date	Discharge type	Receiving water
12	Out	T/81/00241/O/2	696	SE8710511395	10th March 1955	Sewage effluent discharge-storm effluent	River Trent (Tidal)
13	Out	T/81/12308/O	401	SE9035211518	5th December 2017	Public sewage: storm sewage overflow	Bottesford Beck
14	In	CT/81/45022/T1	0	SE8613013405	5th July 1996	Trade discharge - process water	River Trent (Tidal)
15	In	T/81/07110/T/1	0	SE8612013410	16th January 1985	Trade discharge - process water	River Trent (Tidal)
16	In	T/81/22971/S	0	SE8564014710	16th May 1994	Sewage discharges - final/treated effluent - not water company	River Trent
17	In	CT/81/22771/S1	0	SE8564014705	Not Supplied	Sewage treatment works - final effluent	River Trent (Tidal)
18	In	Aj4260	0	SE8638014040	Not Supplied	Unknown	Not Supplied
19	In	T/84/08513/O	1	SE8751013100	18th May 1981	Sewage discharges - pumping station - water company	Tributary of Lysaght's Drain
20	Out	Af7193	672	SE8838013770	Not Supplied	Trade effluent	Not Supplied
21	In	Prnnf02048	86	SE9028014460	17th January 1990	Sewage discharges - final/treated effluent - water company	Tributary of Winterton Brook
22	Out	Npswqd003008	511	SE9013113296	30th September 2008	Sewage discharges - final/treated effluent - not water company	An Un-Named Pond
23	Out	T/84/45535/R	903	SE8447016890	24th September 2009	Sewage discharges - final/treated effluent - water company	Waterton Drain

6.3 Abstractions

- 6.3.1.1 Data derived from the Envirocheck report indicates there are 25 licensed water abstractions in hydraulic connection of the Project. Those with a recorded distance from site as 0m are located within the Application Land.
- 6.3.1.2 The licences are also predominantly for agricultural use (direct spray irrigation), but there are two that have been given for both farming and domestic use. For these two, water is abstracted from Flixborough spring.
- 6.3.1.3 Details of these abstractions are presented in Table 8 and Figure 4.

Table 8: Licensed water abstractions

Map ID	Within hydraulic connection	Licence number	Abstraction	Source	Approx. distance from site (m)	OS grid reference
1	In	03/28/81/0012	General agriculture - spray irrigation - direct	Tributary of Warping Drain	0	SE8640009500
2	Out	03/28/81/0026	General agriculture - transfer between sources	Healey's Drain	138	SE8516008400
3	Out	03/28/81/0026	General agriculture - spray irrigation - storage	Healey's Drain	208	SE8508008410
4	Out	03/28/81/0026	General agriculture - spray irrigation - storage	Healey's Drain	208	SE8508008410
5	Out	03/28/81/0026	General agriculture - spray irrigation - direct	Healey's Drain	208	SE8508008410
6	Out	03/28/81/0026	General agriculture - spray irrigation - direct	Un-Named Drain in Burringham	582	SE8516007900
7	Out	03/28/81/0025	General agriculture - spray irrigation - direct	Burringham - Healey's Drain (B)	710	SE8457008430
8	Out	03/28/81/0026	General agriculture - transfer between sources	Healey's Drain	760	SE8452008430
9	Out	03/28/81/0026	General agriculture - spray irrigation - direct	Healey's Drain	760	SE8452008430
10	Out	03/28/81/0026	General agriculture - spray irrigation - direct	Healey's Drain	780	SE8450008430
11	Out	03/28/81/0026	General agriculture - spray irrigation - direct	Healey's Drain	941	SE8453007900
12	Out	03/28/81/0026	General agriculture - transfer between sources	Healey's Drain	941	SE8453007900

Map ID	Within hydraulic connection	Licence number	Abstraction	Source	Approx. distance from site (m)	OS grid reference
13	Out	03/28/81/0025	General agriculture - spray irrigation - direct	Burringham - Carr Dyke North (D)	1152	SE8421008900
14	Out	03/28/81/0025	General agriculture - spray irrigation - direct	Burringham - Carr Dyke North (C)	1185	SE8410008590
15	Out	03/28/81/0025	General agriculture - spray irrigation - direct	Burringham - Healey's Drain (A)	1210	SE8407008410
16	Out	03/28/81/0025	General agriculture - spray irrigation - direct	Burringham - Carr Dyke North (F)	1335	SE8434009430
17	Out	03/28/81/0025	General agriculture - spray irrigation - direct	Burringham - Carr Dyke North (E)	1397	SE8414009280
18	In	03/28/81/0046/1/R01	General agriculture - spray irrigation - direct	Carr Dyke North - Brumby Common - G To H	1408	SE8436309605
19	In	03/28/81/0046/1	General agriculture - spray irrigation - direct	Carr Dyke North - Brumby Common	1411	SE8436009600
20	In	03/28/81/0046	General agriculture - spray irrigation - direct	Carr Dyke North - Brumby Common	1411	SE8436009600
21	In	03/28/81/0046/1/R01	General agriculture - spray irrigation - direct	Earl Beauchamps Warping Drain	0	SE8645709525
22	In	03/28/81/0046/1	General agriculture - spray irrigation - direct	Earl Beauchamps Warping Drain	0	SE8647009520
23	In	03/28/81/0046	General agriculture - spray irrigation - direct	Earl Beauchamps Warping Drain	0	SE8647009520
24	Out	03/28/81/0037	General agriculture - spray irrigation - direct	Warren Drain	441	SE8647008830
25	Out	03/28/81/00371	Spray irrigation	Warren Drain	441	SE8647008830

Map ID	Within hydraulic connection	Licence number	Abstraction	Source	Approx. distance from site (m)	OS grid reference
26	Out	03/28/81/0012	General agriculture - spray irrigation - direct	Tributary Of Warping Drain	509	SE8690009200
27	Out	03/28/81/0046/1/R01	General agriculture - spray irrigation - direct	Earl Beauchamps Warping Drain	0	SE8616210084
28	Out	03/28/81/0046/1	General agriculture - spray irrigation - direct	Earl Beauchamps Warping Drain	0	SE8616010070
29	Out	03/28/81/0046	General agriculture - spray irrigation - direct	Earl Beauchamps Warping Drain	0	SE8616010070
30	In	03/28/81/0035/1	General agriculture - spray irrigation - direct	Soakmere Drain	32	SE8624011440
31	In	03/28/81/0035	General agriculture - spray irrigation - direct	Soakmere Drain	32	SE8624011440
32	In	03/28/81/00351	Spray irrigation	Soakmere Drain	32	SE8624011440
33	In	03/28/81/0046/1	General agriculture - spray irrigation - direct	Ings Drain	1160	SE8461010110
34	In	03/28/81/0046	General agriculture - spray irrigation - direct	Ings Drain	1160	SE8461010110
35	In	03/28/81/0046/1/R01	General agriculture - spray irrigation - direct	Ings Drain	1164	SE8460510116
36	Out	03/28/85/0002	Industrial processing (miscellaneous)	Scunthorpe Works	1641	SE8411010830
37	Out	03/28/85/0002	Metal - process water	River Trent	1648	SE8410010800
38	Out	03/28/85/0002	Metal - process water	River Trent	1648	SE8410010800
39	Out	03/28/85/0002	Metal - process water	River Trent	1648	SE8410010800
40	Out	03/28/85/0002	Metal - process water	River Trent	1648	SE8410010800
41	Out	03/28/85/0002	Metal - process water	River Trent	1648	SE8410010800

Map ID	Within hydraulic connection	Licence number	Abstraction	Source	Approx. distance from site (m)	OS grid reference
42	Out	03/28/85/0002	Metal - process water	River Trent	1648	SE8410010801
43	Out	03/28/85/0002	Metal - process water	River Trent	1650	SE8409810799
44	Out	03/28/85/0002	Metal - process water	River Trent	1650	SE8409810799
45	Out	03/28/84/0015/1	General agriculture - spray irrigation - direct	Paupers Drain	1339	SE8395015180
46	Out	03/28/84/0015	General agriculture - spray irrigation - direct	Paupers Drain	1339	SE8395015180
47	Out	03/28/84/0002	General agriculture - spray irrigation - direct	Paupers Drain	1349	SE8394015180
48	Out	03/28/84/0002	General agriculture - spray irrigation - direct	Paupers Drain	1349	SE8394015180
49	Out	03/28/84/0002	General agriculture - spray irrigation - direct	Paupers Drain	1349	SE8394015180
50	Out	Md/028/0084/006	General agriculture - spray irrigation - direct	Paupers Drain	1353	SE8393615181
51	Out	03/28/84/0021	General agriculture - spray irrigation - direct	Paupers Drain	1543	SE8375015130
52	In	03/28/81/0034/1	General agriculture - spray irrigation - direct	Lysaghts Drain	0	SE8642013420
53	In	03/28/81/0034	General agriculture - spray irrigation - direct	Lysaghts Drain	0	SE8642013420
54	In	03/28/81/0034/1	Spray irrigation	Park Ings Farm	0	SE8642013420
55	In	4/29/06/*s/011	Spray irrigation	Unnamed Stream	38	SE8800515095
56	In	4/29/06/*S/0011	General agriculture - spray irrigation - direct	Unnamed Stream	44	SE8800015100

Map ID	Within hydraulic connection	Licence number	Abstraction	Source	Approx. distance from site (m)	OS grid reference
57	In	03/28/81/0010	General farming and domestic	Flixborough Spring	87	SE8660015200
58	In	03/28/81/0010	General farming and domestic	Flixborough Spring	87	SE8660015200
59	Out	03/28/81/0038/1	General agriculture - spray irrigation - direct	Burton & Flixborough Drain	0	SE8621015780
60	Out	03/28/81/0038	General agriculture - spray irrigation - direct	Burton & Flixborough Drain	0	SE8621015780
61	Out	03/28/81/00381	Spray irrigation	Burton & Flixborough Drain	0	SE8621015780
62	Out	03/28/84/0031/R01	General agriculture - spray irrigation - direct	Carr Lane Drain	1073	SE8436517045
63	Out	03/28/84/0031/R01	General agriculture - spray irrigation - direct	Carr Lane Drain	1073	SE8436517045
64	Out	03/28/84/0031/R01	General agriculture - spray irrigation - direct	Carr Lane Drain	1073	SE8436517045
65	Out	03/28/84/0031	General agriculture - spray irrigation - direct	Carr Lane Drain	1075	SE8436017040
66	Out	03/28/84/0023/1	General agriculture - spray irrigation - direct	Alluvial Deposit, Garforth - Catchpit	1910	SE8503018350
67	Out	03/28/84/0023	General agriculture - spray irrigation - direct	Alluvial Deposit, Garforth - Catchpit	1910	SE8503018350
68	Out	4/29/06/*S/0033	General agriculture - spray irrigation - direct	Pond On Tributary of Winterton Beck	983	SE8910016300
69	Out	4/29/06/*i/012	Spray irrigation	Tributary Winterton Beck	983	SE8910016300
70	Out	4/29/06/*i/012	Impounding	Tributary Winterton Beck	988	SE8910516305
71	In	4/29/06/*S/0015	General agriculture - spray irrigation - storage	Unnamed Drain	808	SE9050015700

Map ID	Within hydraulic connection	Licence number	Abstraction	Source	Approx. distance from site (m)	OS grid reference
72	In	4/29/06/*S/0015	General agriculture - spray irrigation - storage	Unnamed Drain-Burton Stather	843	SE9046015790
73	In	4/29/06/*S/0015	General agriculture - spray irrigation - storage	Unnamed Drain	843	SE9046015790
74	In	4/29/06/*g/034	Spray irrigation	Bagmoor Lake	1359	SE9050016400
75	In	4/29/05/#s/014	Industrial processing (miscellaneous)	Winterton Beck	1522	SE9065016500

6.4 Flood Risk

- 6.4.1.1 The primary source of information available to practitioners investigating flood risk in England is the Environment Agency’s Flood Map for Planning, which categorises all areas of the country into four distinct ‘Flood Zones’.
- 6.4.1.2 These flood zones show the areas of the country that have the potential to be flooded, and the probability that a flood will occur in any given year (the annual exceedance probability (AEP)).
- 6.4.1.3 Table 9 below sets out the definitions of each flood zone and gives both qualitative and quantitative probabilities of flooding.

Table 9: Flood Zone Definitions

Flood Zone	Definition	Probability of Flooding
Flood Zone 3b	Land where water has to flow or be stored in times of flood based on flood modelling of a 5% AEP event or greater, or land purposely designed to be flooded in an extreme flood event (0.1% AEP).	Very High
Flood Zone 3a	Land that has a high probability of flooding. >1% annual probability of river flooding or >0.5% annual probability of flooding from the sea	High
Flood Zone 2	Land that has a medium probability of flooding (between 0.1-1% from fluvial sources, or 0.1-0.5% annual probability of sea flooding.	Medium
Flood Zone 1	All other land - Land that has a low probability of flooding (<0.1%) probability of river or sea flooding in any given year	Low

- 6.4.1.4 It should be noted that the Flood Zones do not take into account the presence of any existing flood defences.
- 6.4.1.5 Figure 5 presents a map of the Flood Zones around the Project.

6.5 Tidal Sources

- 6.5.1.1 The River Trent is tidal from the Humber Estuary upstream to Keadby Bridge, approximately 5.5km upstream of Flixborough Wharf. The Environment Agency’s ‘Flood Map for Planning’ illustrates that the Application Land and surrounding environment is within Flood Zone 3. Further detail provided in the online North Lincolnshire Strategic Flood Risk Assessment shows that the north-western edge of the Energy Park Land, on the north side of the railway line, is located within Flood Zone 3b.

6.6 Tidal Flood Defences

- 6.6.1.1 The whole of the River Trent along the length of the Project site is protected by raised earth embankments which is illustrated by the whole of the Project site being located within an ‘area benefiting from flood defences’ on the Environment Agency Flood Maps. Hydraulic modelling undertaken as part of the Project has shown that these embankments

provide protection from tidal flood events up to and including the 0.5% AEP event.

- 6.6.1.2 Critical to the successful function of these defences, is the operation of the Environment Agency pump station located on Stather Road. This pump station pumps water from the Lysaght's Drain over the flood defences when levels in the River Trent are high, preventing the free discharge of the Lysaght's Drain.

6.7 Tidal Flooding – Summary

- 6.7.1.1 Based on the information provided by the Environment Agency, it has been determined that during the existing scenario the Application Land is at a low risk of flooding from tidal sources with the defences in place.
- 6.7.1.2 The Application Land is potentially at a 'high' residual risk of flooding from overtopping of the defences during events that exceed a 0.5% AEP (1 in 200 chance) of flooding as well as during a future scenario resulting from climate change up to 2065 as a result of overtopping during an event with a 0.5% AEP (1 in 200 chance) of flooding, or in the event that the defences were to breach.

6.8 Fluvial Flooding

- 6.8.1.1 The Environment Agency's Flood Map for Planning illustrates that the majority of the Application Land is located within Flood Zone 3, meaning that the probability of flooding in any given year is 1% for a fluvial flood event or 0.5% for a tidal flood event. The North Lincolnshire Strategic Flood Risk assessment concludes that the main risk within the area of the site is in fact from tidal inundation, not fluvial flooding.
- 6.8.1.2 The flood risk assessment (FRA) undertaken as part of the Project (**Document Reference 6.3.3**) has shown that the water level associated with 0.5% AEP tidal event, is higher than the 1% AEP fluvial flood level.
- 6.8.1.3 The EA flood maps also illustrate that the majority of that area that is at risk is classed as benefits from flood defences, meaning that the identified area is protected by the existing flood defences and will only become inundated in the event of a breach or overtopping of the defences in the future.
- 6.8.1.4 This benefit is seen in all affected areas of the Project except for Flixborough Wharf itself, and the Southern DHPWN Land, south of the Althorpe to Scunthorpe railway line embankment.
- 6.8.1.5 Further data on fluvial flooding is provided in Annex 3 of the ES (**Document Reference 6.3.3**).
- 6.8.1.6 Based on the above, it has been determined that the majority of the Application Land proposed is at low risk of flooding from fluvial sources (with the defences in place) or resulting from overtopping of the defences during events that exceed a 0.5% AEP on the River Trent.

6.9 Pluvial (surface water) Flooding

- 6.9.1.1 Surface water flooding is caused by overland flow that results from rainfall that fails to drain into the ground through infiltration, instead travelling over

the ground surface. This can be exacerbated where the permeability of the ground is low due to the type of soil (such as clayey soils) and geology or land use including urban developments with impermeable surfaces.

- 6.9.1.2 The Environment Agency ‘Risk of Flooding from Surface Water’ maps indicate areas at risk from surface water flooding when rainwater does not drain away through the normal drainage systems or soak into the ground, but instead lies on or flows over the ground. The mapping indicates that the Application Land is generally not at risk from surface water flooding, with most surface water flooding limited to existing agricultural drains.
- 6.9.1.3 There are a limited number of isolated spots of surface-water flood-risk within the agricultural land within the Energy Park Land, and outside of the Order Limit within the Flixborough Industrial Estate.
- 6.9.1.4 Based on the above data, the majority of the Application Land has been classified as at low risk of flooding from surface water.

6.10 Groundwater Flood Risk

- 6.10.1.1 Groundwater flooding can occur when groundwater levels rise above ground surface levels. The underlying geology has a major influence on where this type of flooding takes place; it is most likely to occur in low-lying areas underlain by permeable rocks (aquifers).
- 6.10.1.2 A review of the North Lincolnshire Strategic Flood Risk Assessment (SFRA) has shown no reported incidents of groundwater flooding in or around the Application Land. Based on this lack of evidence and the nature of the surrounding geology, the Application Land is considered to be at low risk of flooding from groundwater.

6.11 Artificial Waterbodies – Flood Risk

- 6.11.1.1 Environment Agency flood maps indicate that the Application Land is not at risk from reservoir flooding. There are no other artificial waterbodies in close proximity, or within hydraulic connection of the site that could result in inundation of the site in the event of their failure.
- 6.11.1.2 Based on this information, the Application Land is considered to be at low risk of flooding from artificial waterbodies.

6.12 Flood Risk Receptors

- 6.12.1.1 Table 10 below sets out all flood risk receptors identified within close proximity of the Project.

Table 10: Flood Risk Receptors

Receptor	Location Centre Point (Grid Reference)	Value
Project		Very High
Commercial buildings at Flixborough Wharf	SE 85727 14754	High

Receptor	Location Centre Point (Grid Reference)	Value
Commercial buildings within Flixborough Industrial Estate	SE 86204 14597	High
Park Ings Farm (Poultry Farm) Sheds east of the Project	SE 87303 13987	Moderate
Solar Farm	SE 86699 14292	Very High
Agricultural Land within the Energy Park Land	SE 86645 13775	Low
Agricultural Land within the southern DHPWN Land	SE 86077 10405	Low

7. MITIGATION

7.1.1.1 This section describes the mitigation measures considered in the assessment. This includes mitigation that is integral to the design of the Project and good practice mitigation measures that the Project is committed to adopting. All the mitigation measures committed to by the Project are described in this ES and the significance of the residual environmental effects reported takes into account adoption of these measures. In respect of potential impacts on water resources and Flood Risk the mitigation includes the following:

- The layout of the Project: A sequential approach to the design layout has been undertaken, driven by hydraulic modelling to identify the best position of buildings and raised land areas have been introduced in certain locations to reduce the potential to displace flood water to other areas as much as reasonably possible.
- Flood bunds or flood walls will be included within the Project to prevent the displacement of flood water to adjacent sites.
- There will be no abstractions or discharges from or to the River Trent. All operational water will be sourced either from the Anglian Water mains supply or an alternative raw water supply. ~~will be sourced from the mains. Water from the carbon capture system and other facilities will be reused by alternative processes on site and treated process water will be discharged to sewer.~~
- Industry best practices will be applied to the design and construction of water crossings to reduce interaction with watercourses where possible.
- Oil interceptors will be an integral part of the surface water drainage provisions for the Project so that any surface water contaminated by hydrocarbons will be treated prior to discharge.
- Measures will be taken to reduce the potential for leachate, or any surface water that has the potential to be contaminated, to be allowed to enter, directly or indirectly, any water course, underground strata or adjoining land.
- Water inflows to excavated areas will be minimised by the use of lining materials, good housekeeping techniques, and by the control of drainage and construction materials to prevent the contamination of groundwater. Site personnel will be made aware of the potential impact on ground and surface water associated with certain aspects of the construction works to further reduce the incidence of accidental impacts.
- Refuelling of construction vehicles and equipment will be restricted to a designated area with properly designed fuel tanks and bunds and suitable operating procedures.
- Maintenance of construction machinery on-site will be forbidden outside suitably kerbed or bunded areas to prevent the accidental leakage of lubricating and hydraulic fluids.

- Material stockpiles will be sited a minimum distance from watercourses to avoid pollution runoff. Best practice working procedures will be followed to avoid spillages near watercourses.
- All oil and chemical storage tanks and areas where drums are stored will be surrounded by an impermeable bund. Single tanks will be within bunds sized to contain 110% of capacity and multiple tanks or drums will be within bunds sized to contain the greater of 110% of the capacity of the largest tank or 25% of the total tanks' contents (see e.g. Construction Industry Research and Information Association (CIRIA), 2014).
- All relevant works will adhere to The British Standard Code of Practice for Earthworks BS 6031:2009 which contains detailed methods that should be considered for the general control of drainage on construction sites. Further advice is also available in the British Standard Code of Practice for Foundations BS 8004: 1986, CIRIA C649 Control of Water Pollution from Linear Construction projects and C648 controlling water pollution from linear construction projects.

7.1.1.2 The assessment in this section takes such design mitigation into account.

8. ASSESSMENT OF LIKELY EFFECTS

8.1 Conceptual Site Model

- 8.1.1.1 Table 11 provides a tabular representation of a conceptual site model (CSM) of the Project. The CSM is a representation of the potential pollutant linkages arising from the construction, operation and decommissioning of the Project. The CSM identifies a source (of impact), a pathway and a potential receptor. An effect can only occur if all three components are present, creating an impact linkage between the source and the receptor.
- 8.1.1.2 The table highlights the potential impacts from contaminants associated with the Application Land, including unknown contaminants which may already be present within the soil, and the accidental spillage of liquids including diesel and oil. Potential pathways of these pollutants from the source to the receptor include drilling / piling, and surface water runoff. The potential receptors at the site include local surface watercourses and site workers.

Table 11: Conceptual Site Model

Project Activity	Potential Source	Potential Pathway	Potential Receptor
Construction / decommissioning activities could lead to the mobilisation of contaminants already within the topsoil.	Potential contaminants within the topsoil are not anticipated to be present except within the Flixborough Wharf area and eastern laydown area at Dragonby Sidings ⁵	Drilling / piling for foundations could provide a pathway to surface water.	Local surface watercourses.
Accidental spillages, including via vehicles.	Diesel / oil	Surface water runoff could provide a pathway to surface water.	Local surface watercourses.
Site runoff containing elevated suspended sediment levels.	Increased sediment loads	Land clearance, excavation, dewatering of excavations, stockpiles, wheel washing and movement of materials to and from the site	Local surface watercourses.
Accidental leaks	Hazardous materials, particularly concrete and cement products	Uncontrolled washdown water and surface water runoff	Local surface water courses
Traffic Track Out	Dust and debris	Poor site management / surface water runoff.	Local surface watercourses.
Loss of surface water resource availability	n/a	Local abstraction	Local businesses / farms

⁵ Details are provided in Chapter 9 – Ground Conditions, Contamination and Hydrogeology.

Project Activity	Potential Source	Potential Pathway	Potential Receptor
Surface water runoff during operation	Sediment, diesel/oil	Uncontrolled washdown water and surface water runoff	Local drainage systems and surface water features

8.1.1.3 The CSM is useful to show the potential linkages between the Project and surrounding receptors. However, it does not predict the likelihood of them being created. It is anticipated that there is a very minimal risk that any of the pathways listed in the table above will be created, and the likelihood of this is assessed below.

8.1.1.4 On-site surface water runoff will be captured by the site surface-water drainage system and discharged at current green field runoff rates to the existing drainage infrastructure (agricultural drains), thus no contaminated runoff will be created.

8.2 The Energy Park Land

8.2.1 Construction

8.2.1.1 With the exception of mixing concrete (see below), only small amounts of water will be required each day for general construction works (e.g. wheel washing and dust suppression) and hygiene. It is likely that this water will initially be brought in by bowser, prior to a mains connection being installed, and therefore no water abstractions will be required. The impact of construction on water use from local sources will therefore be negligible.

8.2.1.2 The greatest water requirement in construction projects such as this is usually for the mixing of concrete. Either ready-mixed concrete will be used or ~~the mains supply will be used to meet the water requirement for~~ on-site batching is required water will be sourced either from the Anglian Water mains supply or an alternative raw water supply. As such, no dedicated abstractions of surface water or groundwater will be needed for the Project and therefore there will be no effects on water availability for other local abstraction users.

8.2.1.3 Construction activities could require the disposal of water from the Application Land. Therefore, all construction contractors will be required, in conjunction with Project, to reach an agreement with the EA with regard to detailed methods of disposal. This is likely to be via a licensed contractor as set out in a Construction Environmental Management Plan (CEMP) (see also CoCP, Annex 7, **Document Reference 6.3.7**), but will be agreed prior to construction.

8.2.1.4 During construction, if it is necessary to install a temporary diesel storage tank for onsite construction machinery, generators etc. this will be double-skinned and/or contained within an impermeable bund sized to hold 110 per cent of the total tank contents for the prevention of releases to the environment. Maintenance of construction machinery on-site will be forbidden outside suitably kerbed or bunded areas to prevent the

accidental leakage of lubricating and hydraulic fluids. Therefore, the impact of accidental spillages on surface water bodies and groundwater during construction will be negligible.

- 8.2.1.5 Construction activities, if uncontrolled, could potentially cause leaching of ground contamination (in the event it is present) to surface waters due to the creation of soil piles formed during excavation, levelling and other such on-site works.
- 8.2.1.6 The main impacts on surface waters within the Energy Park Land will likely be associated with the crossing of larger IDB drains and agricultural ditches (such as Lysaght's Drain and Ferry Road West Drain) by the new access roads and utility connections, including the diversion of channels around the ash handling and treatment facility, and the potential sedimentation and smothering of surrounding watercourses associated with runoff from works areas.
- 8.2.1.7 Mitigation of these effects will be provided by the implementation of measures to be set out in detail in the CEMP (see CoCP, **Document Reference 6.3.7**) which will include industry best practice techniques to reduce in-channel / wet working as far as is reasonably practicable to reduce the release of suspended sediments into the watercourse. Where watercourses are required to be culverted, culverts will be constructed in a manner that allows the development of a natural bed and affected banks will be reinstated and reinforced where necessary to reduce the risk of future erosion and sedimentation.
- 8.2.1.8 Where the beds of these watercourses are required to be excavated to facilitate the installation of the DHPWN pipes, cables and other utilities, this will be carried out by temporarily damming the watercourse and over-pumping the construction area to avoid the need for wet working, which will be more detrimental to the water environment.
- 8.2.1.9 All works will be undertaken in consultation with Scunthorpe & Gainsborough Water Management Board (SGWMB) to their required standards.
- 8.2.1.10 As the construction compounds and much of the Project within the Energy Park Land will be located within Flood Zone 2 and 3, the CEMP will include the requirement to comply with a flood management plan, which will be prepared by the contractor and agreed with the Environment Agency (see also outline Flood Management Plan (see CoCP, **Document Reference 6.3.7, Annex 7**). The flood management plan will be designed to reduce the potential consequence from a flood occurring during the construction phase.
- 8.2.1.11 This flood management plan will include clauses substantially in accordance with those presented below.
- The site will be required to sign up to the Environment Agency's flood warning system.
 - Excavated materials will be stockpiled in areas at the lowest possible risk of flooding to prevent mobilisation and displacement of flood water.

- The length of trench excavations will be limited to a reasonable distance to allow rapid backfilling in the event of a flood warning being issued (to prevent the trench becoming a route for flooding).

8.2.1.12 Given the mitigation described above, the findings of the assessment are that the effects on water resources from construction within the Energy Park Land will be not significant with the exception of moderate adverse effects on Lysaght's Drain temporarily during the construction works themselves.

8.2.1.13 Table 12 below summarises the potential impacts of the construction activities within the Energy Park Land on the surrounding water environment. As flood risk impact will be mitigated through measures to be contained in the CEMP construction Flood Management Plan (see CoCP, **Document Reference 6.3.7, Annex 7**), these are not listed in the table.

Table 12: Summary of construction effects

Receptor	Sensitivity / value	Impact	Magnitude	Significance
Watercourses				
River Trent	Very High	None Envisaged	Negligible	Negligible - Not Significant
Lysaght's Drain	High	Culverting of a short length of the drain to facilitate construction of the new access road. Temporary excavation of channel bed to install DHN pipes, cables and other utilities.	Small	Moderate adverse - Significant
Lysaght's Drain Tributary 1	Low	None Envisaged	Negligible	Negligible - Not Significant
Lysaght's Drain Tributary 2	Low	None Envisaged	Negligible	Negligible - Not Significant
Lysaght's Drain Tributary 3	Low	None Envisaged	Negligible	Negligible - Not Significant
Lysaght's Drain Tributary 4	Low	Temporary Crossing	Small	Negligible - Not Significant
Lysaght's Drain Tributary 5	Low	None Envisaged	Negligible	Negligible - Not Significant
Lysaght's Drain Tributary 6	Low	Temporary Crossing	Small	Negligible - Not Significant
Lysaght's Drain Tributary 7	Low	None Envisaged	Negligible	Negligible - Not Significant
Lysaght's Drain Tributary 8	Low	Culverting and realignment	Large	Minor adverse – Not significant
Lysaght's Drain Tributary 9	Low	Culverting and realignment	Large	Minor adverse – Not significant
Lysaght's Drain Tributary 10	Low	Culverting and realignment	Large	Minor adverse – Not significant
Lysaght's Extension	Low	None Envisaged	Negligible	Negligible - Not Significant
Ferry Road West Drain	Low	None Envisaged	Negligible	Negligible - Not Significant

Receptor	Sensitivity / value	Impact	Magnitude	Significance
Neap House Drain	Low	None Envisaged	Negligible	Negligible - Not Significant
Discharges				
CT/81/45022/T1 (14)	Low	These discharges are located at the Environment Agency pump station from Lysaght's Drain into the River Trent. The Project will be specifically designed to prevent any disruption to the operation of the pump station.	Negligible	Negligible - Not Significant
T/81/07110/T /1 (15)	Low		Negligible	Negligible - Not Significant
Aj4260 (18)	Low	This is a historic licence from a former chemical production site that was demolished in 2013.	Negligible	Negligible - Not Significant
T/84/08513/O (20)	Low	These licences refer to a combined sewer overflow (CSO) from the adjacent industrial park. The Project will not affect the operation of this CSO.	Negligible	Negligible - Not Significant
Abstractions				
03/28/81/0034/1 (52)	High	These licences refer to a single point of abstraction for spray irrigation for the Lysaght's Drain. The abstraction is located downstream of the proposed road crossing of the Lysaght's Drain. Best available construction practices will be employed to prevent sediment release into the watercourse which could affect the suitability of the abstraction for irrigation.	Negligible	Negligible - Not Significant
03/28/81/0034 (53)	High		Negligible	Negligible - Not Significant
03/28/81/0034/1 (54)	High		Negligible	Negligible - Not Significant

8.2.2 Operation

8.2.2.1 The operational demand for water from all elements of the Project within the Energy Park Land vary significantly. Table 13 below presents the operational water requirement for each element, excluding any non-routine uses such as firewater [and including efficiencies gained through the use of water captured as a result of the carbon capture and storage process and from other facilities.](#)

Table 13: Routine Operational Water Demand

Project Element	Net Operational Water Demand m ³ /hour	Source
ERF	8.93 1.8 (total of 7.6 with 5.8 provided by carbon capture effluent)	Anglian water Mains or an alternative raw water supply
CCUS	5.35	
Switch yard	0.0	
Water treatment facility ⁶	N/A	
Hydrogen production and storage facility	2.01	
Gas AGI	0.0	
EV and hydrogen re-fuelling station	0.0	
Battery storage	0.0	
RHTF	0 1.08 (total of 1.27 provided by carbon capture effluent)	
CBMF	0 1.59 (total of 1.71 provided by carbon capture effluent)	
PRF	1.48 2.3	
Potable	0.81	
Total	6.67 11.15 (total of 19.93 excl. carbon capture effluent)	

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8.2.2.2 The largest operational demand for water will be from the ERF, where most water will be used to replenish losses within the steam cycle, which generates steam to drive the turbines and generate electricity. This demand is followed closely by water used in the carbon capture plant where it is used within the amine capture system to provide cooling and replenish amine solutions.

8.2.2.3 The hydrogen production and storage facility also requires a continual source of water as hydrogen (H₂) is produced by the splitting of the H₂ and oxygen atoms which make up the water.

⁶ The water treatment plant supplies water to the ERF and CCUS, but does not have its own water demand.

- 8.2.2.4 Water will also be essential for the ash treatment, CBMFs and PRFs, where water is needed for the washing and treatment of materials in those areas, as well as for the manufacture of concrete blocks. A relatively small quantity of water will also be used for potable, hygiene and sanitary purposes by workers and visitors to the Project.
- 8.2.2.5 ~~As is stated above, a~~All water for use within the Project will be sourced either from the Anglian Water mains supply or an alternative raw water supply. Assurances have been received from Anglian Water that the increased demand on their network could be catered for, potentially utilising a combination of potable water and an alternative raw water supply ~~could be catered for~~, and as such, no effects on the supply of water to other users is envisaged as a result of the Project.

8.2.3 Water Management

- 8.2.3.1 To comply with the NPPF exception test, which states that new developments must be able to operate safely for the duration of their lifetime, whilst not increasing flooding to other areas, it will be necessary to construct the Project on a raised ground level set above the modelled 0.5% AEP tidal flood level. By raising the ground level to achieve this raised threshold level, there will be the potential for floodwater to be displaced and affect the surrounding receptors.
- 8.2.3.2 To prevent increased flooding to surrounding areas outside the Application Land, the Project design will include raised earth flood bunds at the perimeter of the Application Land adjacent to, Park Ings Farm (poultry farm), to the west of the proposed access road and flood walls in Flixborough Industrial Estate.
- 8.2.3.3 Hydraulic modelling has shown that these raised defences are predicted to be effective at preventing any increase in flooding to these receptors up to and including the 0.5% AEP flood event, even in the event of a breach in the existing flood defences at Flixborough Wharf or 3km north of the site.
- 8.2.3.4 However, the construction of these raised defences will result in an increase in flood depth on the agricultural land north of Ferry Road West and at the commercial warehouse (Storage Shed) within Flixborough Wharf itself (Figure 6).
- 8.2.3.5 Compared with current conditions, the Project is predicted to lead to an increase in the amount of runoff from the new areas of hard standing associated with each project element: ERF, carbon capture utilisation and storage facility (CCUS), switchyard, hydrogen production and storage facility, gas AGI, H₂ fuel cells, EV and H₂ re-fuelling station, battery storage, RHTF, CBMF, PRF, and access roads.
- 8.2.3.6 All elements of the Project within the Energy Park Land will be connected into a surface water drainage system and a sewerage system. The specifics of these systems will be confirmed during the detailed design stage, however at this stage, the surface water drainage strategy includes ten new surface water attenuation detention basins located to the west and east of the access road and south of the railhead and visitor centre and one new storage tank (Figure 7).

- 8.2.3.7 This attenuation area will collect all of the above sources of surface water runoff, from where it will discharge into the Lysaght's Drain at greenfield run off rates as agreed with SGWMB.
- 8.2.3.8 Before reaching the Lysaght's Drain the runoff will pass through a number of treatment and attenuation chains, including sediment and oil interceptors. Therefore, impacts on Lysaght's Drain due to accidental spillages and leaks will be negligible.
- 8.2.3.9 The network has been designed to split up trade effluent and domestic effluent. The trade effluent will be treated and reused in the various processes on site. An effluent treatment plant facility will be located in the ERF building. This will mean that there is no trade effluent discharge to the public sewer or to the wetland areas. The domestic effluent will discharge to the public sewer as agreed with Severn Trent Water.
- 8.2.3.10 Table 14 below presents the potential impacts of the operational activities within the Energy Park Land on the surrounding water environment.

Table 14: Summary of effects from operational activities within the Energy Park Land

Receptor	Sensitivity / value	Impact	Magnitude	Significance
Flood Risk Receptors				
Project	Very High	None Envisaged – the development will be constructed on a raised ground level or be buried below ground.	Negligible	Not Significant
Commercial buildings at Flixborough Wharf	High	Increased depth of flooding by >25mm	Small	Moderate Adverse - Significant
Commercial buildings within Flixborough Industrial Estate	Moderate	None Envisaged – protected from flooding by flood protection provisions within the design.	Negligible	Not Significant
Park Ings Farm (poultry farm sheds) east of the Project	High	None Envisaged – protected from flooding by flood embankment within the design.	Negligible	Not Significant
Solar Farm	Very High	None Envisaged	Negligible	Not Significant
Agricultural Land within the Energy Park Land	Low	Increased depth of flooding by >25mm	Small	Negligible – Not Significant
Agricultural Land within the southern DHPWN Land	Low	Increased depth of flooding by >25mm	Small	Negligible – Not Significant
Anglian Water Network	Very High	Increased demand on water infrastructure	Negligible	Not Significant
Watercourses				
River Trent	Very High	None Envisaged	Negligible	Not Significant
Lysaght's Drain	High	Discharge of attenuated and treated surface water	Negligible	Not Significant
Lysaght's Drain Tributary 1	Low	None Envisaged	Negligible	Not Significant
Lysaght's Drain Tributary 2	Low	None Envisaged	Negligible	Not Significant

Receptor	Sensitivity / value	Impact	Magnitude	Significance
Lysaght's Drain Tributary 3	Low	None Envisaged	Negligible	Not Significant
Lysaght's Drain Tributary 4	Low	None Envisaged	Negligible	Not Significant
Lysaght's Drain Tributary 5	Low	None Envisaged	Negligible	Not Significant
Lysaght's Drain Tributary 6	Low	None Envisaged	Negligible	Not Significant
Lysaght's Drain Tributary 7	Low	None Envisaged	Negligible	Not Significant
Lysaght's Drain Tributary 8	Low	None Envisaged	Negligible	Not Significant
Lysaght's Drain Tributary 9	Low	None Envisaged	Negligible	Not Significant
Lysaght's Drain Tributary 10	Low	None Envisaged	Negligible	Not Significant
Lysaght's Extension	Low	None Envisaged	Negligible	Not Significant
Ferry Road West Drain	Low	None Envisaged	Negligible	Not Significant
Neap House Drain	Low	None Envisaged	Negligible	Not Significant
Surface water discharges				
CT/81/45022/T1	Low	None Envisaged	Negligible	Not Significant
T/81/07110/T /1	Low	None Envisaged	Negligible	Not Significant
T/81/22971/S	Low	None Envisaged	Negligible	Not Significant
CT/81/22771/S1	Low	None Envisaged	Negligible	Not Significant
Aj4260	Low	None Envisaged	Negligible	Not Significant
T/84/08513/O	Low	None Envisaged	Negligible	Not Significant
Surface water abstractions				
03/28/81/0034/1	High	None Envisaged	Negligible	Not Significant
03/28/81/0034	High	None Envisaged	Negligible	Not Significant
03/28/81/0034/1	High	None Envisaged	Negligible	Not Significant

8.2.4 Decommissioning

- 8.2.4.1 During decommissioning similar potential pathways and risks arise as during the construction phase, and it is not anticipated that there will be any material differences in the impacts on water quality or water resources from those described for the construction phase.

8.3 Rail Line

8.3.1 Construction

- 8.3.1.1 The proposed new railway works including, sidings at Dragonby, reinstatement of the spur, and construction of a railhead pass over and construction compound to the west of Dragonby Sidings, are all in close proximity to a number of waterbodies, including Winterton Beck and its tributaries, Burton and Flixborough Drain and associated agricultural drains, and the River Trent.
- 8.3.1.2 The same mitigation measures will be used during the construction of the Rail Line as described for the construction of the elements of the Project (e.g. working to best practice and in line with the CEMP) in Section 8.2.
- 8.3.1.3 There are no anticipated works within any watercourses that pass under the rail line in culverts, and there will be no requirement to modify any of these receptors during the process of upgrading the rail line.
- 8.3.1.4 It is therefore considered likely that any construction activities for this Rail Line will have no significant effects on the water resources along the length of the reinstated railway.
- 8.3.1.5 There is one watercourse (Unnamed Drain 5) located within land allocated as the potential laydown / construction compound area east of Dragonby Sidings. Unnamed Drain 5 is a small agricultural drain or ditch running along the southern edge of Hopeton Street.
- 8.3.1.6 Access to the construction compound area will be via the existing field access which crosses this drain, and no works are anticipated to be required to modify this crossing. The compound itself will be set up in full compliance with the CEMP which will make provision for a minimum distance from the watercourse to reduce the risk of spillages resulting in pollution of the watercourse. With these mitigation measures in place, the impact on this water body from the construction compounds will be negligible and will have no significant effects.
- 8.3.1.7 Table 15 below presents the potential impacts of the construction activities associated with the upgrade of the rail line.

Table 15: Summary of the effects of construction activities associated with the rail line

Receptor	Sensitivity / value	Impact	Magnitude	Significance
Watercourses				
Winterton Beck	High	None envisaged	Negligible	Negligible - Not Significant
Winterton Beck Tributary 1	Low	These watercourses are culverted under the railway. There are no anticipated plans to modify the culvert during the construction phase.	Negligible	Negligible - Not Significant
Winterton Beck Tributary 2	Low		Negligible	Negligible - Not Significant
Winterton Beck Tributary 3	Low		Negligible	Negligible - Not Significant
Burton and Flixborough Drain	Low	Non envisaged	Negligible	Negligible - Not Significant
Burton and Flixborough Drain Tributary 1	Low	Non envisaged	Negligible	Negligible - Not Significant
Burton and Flixborough Drain Tributary 2	Low	These watercourses are culverted under the railway. There are no anticipated plans to modify the culvert during the construction phase.	Negligible	Negligible - Not Significant
Burton and Flixborough Drain Tributary 3	Low		Negligible	Negligible - Not Significant
Burton and Flixborough Drain Tributary 4	Low		Negligible	Negligible - Not Significant
Unnamed Drain 5	Low	Crossed by existing field access to construction compound.	Negligible	Negligible - Not Significant
Discharges				
T/81/22971/S	Low	The construction of the Project will not include any works that will alter these discharge outfalls.	Negligible	Negligible - Not Significant
CT/81/22771/S1	Low		Negligible	Negligible - Not Significant
Prnfn02048	Low		Negligible	Negligible - Not Significant
Abstractions				

Receptor	Sensitivity / value	Impact	Magnitude	Significance
4/29/06/*s/011 (55)	High	None envisaged – located a long way down stream of all construction works. Industry best practice construction techniques presented in the Code of Construction Practice and secured by DCO requirement will reduce the risk for deterioration in water quality at these abstractions.	Negligible	Negligible - Not Significant
4/29/06/*S/0011 (56)	High		Negligible	Negligible - Not Significant
03/28/81/0010 (57)	High		Negligible	Negligible - Not Significant
03/28/81/0010 (58)	High		Negligible	Negligible - Not Significant
4/29/06/*S/0015 (71)	High		Negligible	Negligible - Not Significant
4/29/06/*S/0015 (72)	High		Negligible	Negligible - Not Significant
4/29/06/*S/0015 (73)	High		Negligible	Negligible - Not Significant
4/29/06/*g/034 (74)	High		Negligible	Negligible - Not Significant
4/29/05/#s/014 (75)	High		Negligible	Negligible - Not Significant

8.3.2 Operation

- 8.3.2.1 As agreed with the Planning Inspectorate during Scoping, and presented in Table 1, the Inspectorate agrees that no significant effects on these water resources would be likely to arise from the reopening and operation of the disused rail spur, and thus this matter has been scoped out of the assessment.

8.3.3 Decommissioning

- 8.3.3.1 During decommissioning similar potential pathways and risks are likely to arise as during the construction phase, and it is not anticipated that there will be any material differences in the impacts on water quality or water resources from those described for the construction phase, all of which are manageable through good working practices.

8.4 The Southern DHPWN Land

8.4.1 Construction

- 8.4.1.1 Construction of the DHPWN will require the excavation of a trench to the designed depth and width to accommodate the pre-insulated pipes and cabling. Where the DHPWN are required to cross watercourses, ducts will be installed beneath the channel, and connected to the trench at either side. For a trenched crossing option, these ducts will be installed by damming the upstream section and over-pumping whilst excavating and installing takes place. For a trenchless option, a thrust boring or similar technique will be adopted.
- 8.4.1.2 Either crossing technique will avoid the need to 'wet work', thus eliminating the potential for suspended sediments to be released into the watercourse during the excavation and reduce the potential for spillage or washing-off of hydrocarbon-based pollutants from excavation machinery.
- 8.4.1.3 Once ducts are installed for the trenched option, the channel banks and bed will be reinstated to their original condition and the dam will be removed in a controlled fashion to allow the watercourse to flow in its previous condition.
- 8.4.1.4 Taking into account these mitigation measures, it is considered that the crossing of watercourses for the construction of the Southern DHPWN will have no significant effects other than at the crossing of Lysaght's Drain where moderate adverse effects are predicted temporarily during the construction works themselves.
- 8.4.1.5 The Southern DHPWN will require the setting up of a construction compound located on land to the west of the M181. This will be located a minimum of 10m away from any surface water features as dictated by the CEMP and will fully comply with the requirements of the CEMP with regards to the storage and use of any potential pollutants (fuels, oils etc.) (see CoCP, **Document Reference 6.3.7**).
- 8.4.1.6 As this construction compound and much of the Southern DHPWN will be located within Flood Zone 2, the CEMP will also include the requirement to

comply with a flood management plan, which will be prepared by the contractor and agreed with the Environment Agency. The flood management plan will be designed to reduce the potential consequence from a flood occurring during the construction phase.

- 8.4.1.7 This flood management plan will include clauses substantially in accordance with those presented below.
- The site will be required to sign up to the Environment Agency's flood warning system.
 - Excavated materials will be stockpiled in areas at the lowest possible risk of flooding to prevent mobilisation and displacement of floodwater.
 - The length of trench excavations will be limited to a reasonable distance to allow rapid backfilling in the event of a flood warning being issued (to prevent the trench from becoming a route for flooding).
- 8.4.1.8 Table 16 below summarises the potential impacts of the construction activities within the Southern DHPWN Land on the surrounding water environment. As flood risk impact will be mitigated through measures to be contained in the CEMP, these are not listed in the table.

8.4.2 Operation

- 8.4.2.1 As the DHPWN will comprise buried pipes and cables, once operational, they will have no impacts on any surrounding waterbodies. Furthermore, there will be no operational water requirement for this element of the Project.
- 8.4.2.2 As such, the findings of this assessment are that operation of the Southern DHPWN will have no significant effects on water quality or water resources in the vicinity of the Project.

8.4.3 Decommissioning

- 8.4.3.1 Following the decommissioning of the Project, it is anticipated that the pipeline will be left in-situ, as its removal will cause more environmental disruption than leaving it in place.
- 8.4.3.2 As such, there are no decommissioning activities for this element of the Project, and the impacts on water quality and water resources will be negligible.

Table 16: Summary of effects of the construction activities associated with the Southern DHPWN

Receptor	Sensitivity / value	Impact	Magnitude	Significance
Watercourses				
Lysaght's Drain	High	Temporary excavation of channel bed to install DHPWN pipes and other utilities.	Small	Moderate adverse – Significant
Lysaght's Drain Tributary 1	Low	Located downstream of the construction works. Best practice construction techniques within the CEMP and secured by DCO requirements will be employed to prevent accidental spillages that could affect watercourses located downstream of the works.	Negligible	Not significant
Lysaght's Drain Tributary 2	Low		Negligible	Not significant
Lysaght's Drain Tributary 3	Low		Negligible	Not significant
Lysaght's Drain Tributary 4	Low	Temporary Crossing.	Small	Negligible - Not significant
Lysaght's Drain Tributary 5	Low	Located downstream of the construction works. Best practice construction techniques within the CEMP and secured by DCO requirements will be employed to prevent accidental spillages that could affect watercourses located downstream of the works.	Negligible	Not significant
Lysaght's Drain Tributary 6	Low	Within the Application Land and crossed by the Southern DHPWN. May require temporary damming and over-pumping or trenchless excavation to facilitate the construction of the pipeline and associated utilities.	Small	Not significant
Lysaght's Drain Tributary 7	Low	Located downstream of the construction works. Best practice construction techniques within the CEMP and secured by DCO requirements will be employed to prevent accidental spillages that could	Negligible	Not significant

Receptor	Sensitivity / value	Impact	Magnitude	Significance	
		impact watercourses located downstream of the works. spillage			
Lysaght's Drain Tributary 8	Low	Within the Application Land and crossed by the Southern DHPWN. May require culverting and realignment.	Large	Minor adverse – not significant	
Lysaght's Drain Tributary 9	Low		Large	Minor adverse – not significant	
Lysaght's Drain Tributary 10	Low		Large	Minor adverse – not significant	
Lysaght's Extension	Low	Located downstream of the construction works. Best practice construction techniques within the CoCP and secured by DCO requirements will be employed to prevent accidental spillages that could affect watercourses located downstream of the works.	Negligible	Not significant	
Ferry Road West Drain	Low		Negligible	Not significant	
Neap House Drain	Low		Negligible	Not significant	
Neap House Drain Tributary 1	Low		Negligible	Not significant	
Neap House Drain Tributary 2	Low		Negligible	Not significant	
Neap House Drain Tributary 3	Low		Within the Application Land and crossed by the Southern DHPWN. May require temporary damming and over-pumping or trenchless excavation to facilitate the construction of the pipeline and associated utilities.	Small	Negligible - Not significant
Jaque's Drain	Low			Small	Negligible - Not significant
Jaque's Drain Tributary 1	Low	Located downstream of the construction works. Best practice construction techniques within the CEMP and secured by DCO requirements will be employed to prevent accidental spillages that could impact watercourses located downstream of the works.	Negligible	Not significant	
Jaque's Drain Tributary 2	Low		Negligible	Not significant	
Jaque's Drain Tributary 3	Low		Negligible	Not significant	
Jaque's Drain Tributary 4	Low		Negligible	Not significant	
Guinness House Drain	Low	Within the Application Land and crossed by the Southern DHPWN. May require temporary damming and over-pumping	Small	Negligible - Not significant	
Brumby Sewer	Low		Small	Negligible - Not significant	
Earl Beauchamp's Warping Drain	Low		Small	Negligible - Not significant	

Receptor	Sensitivity / value	Impact	Magnitude	Significance
Unnamed Drain 1	Low	or trenchless excavation to facilitate the construction of the pipeline and associated utilities.	Small	Negligible - Not significant
Unnamed Drain 2	Low		Small	Negligible - Not significant
Unnamed Drain 3	Low		Small	Negligible - Not significant
Unnamed Drain 4	Low		Small	Negligible - Not significant
Unnamed Drain 6	Low	Located downstream of the construction works. Best practice construction techniques within the CEMP and secured by DCO requirements will be employed to prevent accidental spillages that could affect watercourses located downstream of the works.	Negligible	Not significant
Unnamed Drain 7	Low		Negligible	Not significant
Unnamed Drain 8	Low		Negligible	Not significant
Unnamed Drain 9	Low		Negligible	Not significant
Unnamed Drain 10	Low		Negligible	Not significant
Unnamed Drain 11	Low		Within the Application Land and crossed by the Southern DHPWN. May require temporary damming and over-pumping or trenchless excavation to facilitate the construction of the pipeline and associated utilities.	Small
Unnamed Drain 12	Low	Small		Negligible - Not significant
Unnamed Drain 13	Low	Small		Negligible - Not significant
Unnamed Drain 14	Low	Small		Negligible - Not significant

Discharges

N/A – there are no discharges within hydraulic connection of the Southern DHPWN

Abstractions

18 - 03/28/81/0046/1/R01	High	Located downstream of the construction works. Best practice construction techniques within the CEMP and secured by DCO requirements will be employed to prevent accidental spillages that could affect the water quality at these abstractions.	Negligible	Not significant
19 - 03/28/81/0046/1	High		Negligible	Not significant
20 - 03/28/81/0046	High		Negligible	Not significant
27 - 03/28/81/0046/1/R01	High	These licences refer to a single point of abstraction for spray irrigation for the	Negligible	Not significant
28 - 03/28/81/0046/1	High		Negligible	Not significant

Receptor	Sensitivity / value	Impact	Magnitude	Significance
29 - 03/28/81/0046	High	Lysaght's Drain. The abstraction is located downstream of the proposed road crossing of the Earl Beauchamps Warming Drain. Best available construction practices will be employed to prevent sediment release into the watercourse which could affect the suitability of the abstraction for irrigation.	Negligible	Not significant
30 - 03/28/81/0035/1	High	Located downstream of the construction works. Best practice construction techniques within the CEMP and secured by DCO requirements will be employed to prevent accidental spillages that could affect the water quality at these abstractions	Negligible	Not significant
31 - 03/28/81/0035	High		Negligible	Not significant
32 - 03/28/81/0035/1	High		Negligible	Not significant
33 - 03/28/81/0046/1	High		Negligible	Not significant
34 - 03/28/81/0046	High		Negligible	Not significant
35 - 03/28/81/0046/1/R01	High		Negligible	Not significant

8.5 The Northern DHPWN Land

- 8.5.1.1 None of the water resource receptors identified in Section 6 are located along the route of the Northern DHPWN which runs along Phoenix Parkway and into Scunthorpe town centre.
- 8.5.1.2 All receptors identified in Section 6 have been assessed in Sections 8.2 through 8.4.

9. CONCLUSIONS

- 9.1.1.1 The baseline water environment of the Application Land has been described in detail and the principal receptors within hydraulic connection of the Project which have the potential to be affected by its construction, operation and decommissioning have been described.
- 9.1.1.2 The construction and decommissioning activities of the Project have the potential to have adverse effects upon a number of agricultural drains and ditches within and downstream of the Application Land. No WFD water bodies will be affected. With the implementation of the mitigation as set out in Section 7, along with the measures set out in the CoCP (**Document Reference 6.3.7**) (as developed into further detail in a CEMP and related plans at the pre-construction stage), this assessment concludes that the effects of the construction and decommissioning of the Project will not result in any significant effects on flooding and the water environment, other than one exception: moderate adverse effects on Lysaght's Drain are predicted temporarily during the construction works themselves. The CEMP will stipulate the necessary inspection and monitoring measures to demonstrate that mitigation measures are implemented properly, in a timely manner and work as anticipated.
- 9.1.1.3 With the implementation of the mitigation as set out in Section 7, this assessment concludes that the effects of the operation of the Project will result in a significant effect at just one receptor and only during a breach scenario: the commercial building at Flixborough Wharf, located to the north of the wharf. This building is currently used as a stockpile and storage warehouse. To manage the areas where the increase in flood risk has not been mitigated, a Flood Management Plan will be developed for the Project. The plan will be used to primarily manage the increased depth and hazard identified in Zone B, port area, and to alert users of a potential flood event. Recommended measures include signing up to the EA flood warning alert system and Met Office weather forecasts and disseminating information from the visitor centre across the site using information boards, phone messaging and text messaging services. The proposed measures within the Flood Management Plan will be developed in consultation with the Environment Agency and North Lincolnshire Council's emergency planners.
- 9.1.1.4 The details of this Flood Management Plan will be agreed with the Environment Agency and secured as a requirement of the DCO application.
- 9.1.1.5 The Operational Environmental Management Plan (OEMP) (**Document Reference 6.3.8**) contains the necessary inspection and monitoring measures to demonstrate that mitigation measures are implemented properly, in a timely manner and work as anticipated.

10. REFERENCES

- Construction Industry Research and Information Association (CIRIA) (2014) Containment systems for the prevention of pollution (C736F)
- Ministry of Housing, Communities and Local Government, 2014, Planning Practice Guidance 'Flood Risk and Coastal Change'
- Department for Communities and Local Government, 2014, National Planning Policy for Waste
- The Flood Risk Regulations, 2009
- The Flood and Water Management Act, 2010
- Department for Environment, Food and Rural Affairs, 2017, The Water Environment (Water Framework Directive) (England and Wales) Regulations
- Department for Environment, Food and Rural Affairs, 2016, The Environmental Permitting (England and Wales) Regulations
- North and North East Lincolnshire Strategic Flood Risk Assessment, November 2011
- North Lincolnshire Local Development Framework, Core Strategy, Adopted June 2011
- North Lincolnshire Council, SuDS and Flood Risk Guidance Document, April 2017

FIGURES

Date: October 2023

North Lincolnshire Green Energy Park

Title Figure 1
Study Area

Client Information

Client North Lincolnshire
Green Energy
Park Ltd
PINS Proj No EN010116
Date 15/03/2022
Drawn by MTC
Checked by HB
Version P0


Map Information

CRS EPSG 27700
CRS Name British National
Grid
Scale 55,000

ArcMap File

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Projects\0483091 - Solar
21\MAPS\HYD\ES\HYD_ES_StudyArea_A01.mxd

Legend

 Order Limits

Layer Source Information

Source: Esri, Maxar, GeoEye, Earthstar
Geographics, CNES/Airbus DS, USDA,
USGS, AeroGRID, IGN, and the GIS User
Community

DO NOT SCALE THIS DRAWING



North Lincolnshire Green Energy Park

Title Figure 2
WFD
Catchments

Client Information




Client North Lincolnshire Green Energy Park Ltd
PINS Proj No EN010116
Date 15/03/2022
Drawn by MTC
Checked by HB
Version P0

Map Information

CRS EPSG 27700
CRS Name British National Grid
Scale 55,000

ArcMap File
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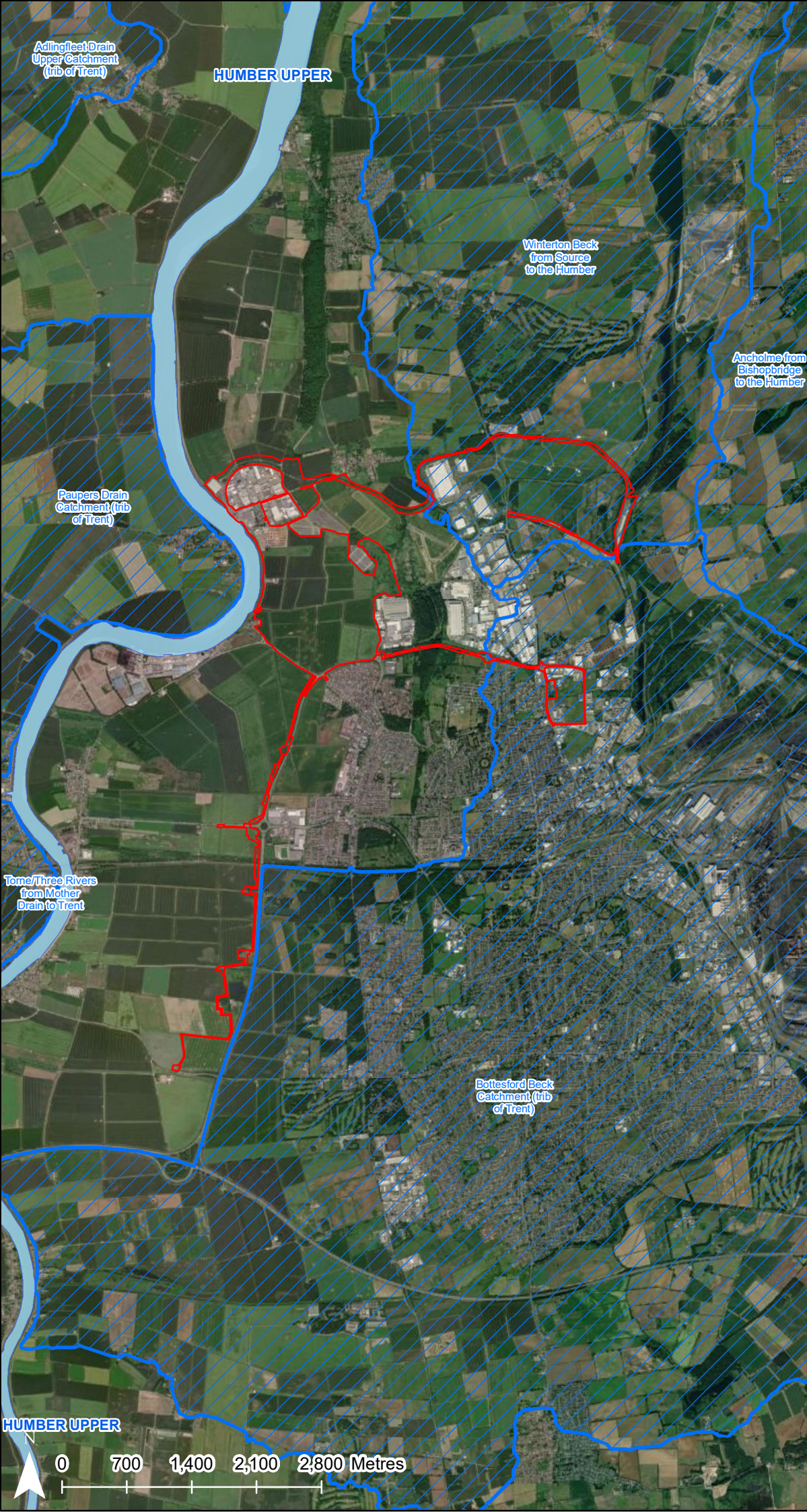
Legend

-  Order Limits
-  River Catchment
-  Transitional Water

Layer Source Information

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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North Lincolnshire Green Energy Park

Title Figure 3
Discharge Permits

Client Information

Client North Lincolnshire Green Energy Park Ltd
PINS Proj No EN010116
Date 15/03/2022
Drawn by MTC
Checked by HB
Version P0

Map Information

CRS EPSG 27700
CRS Name British National Grid
Scale 55,000

ArcMap File

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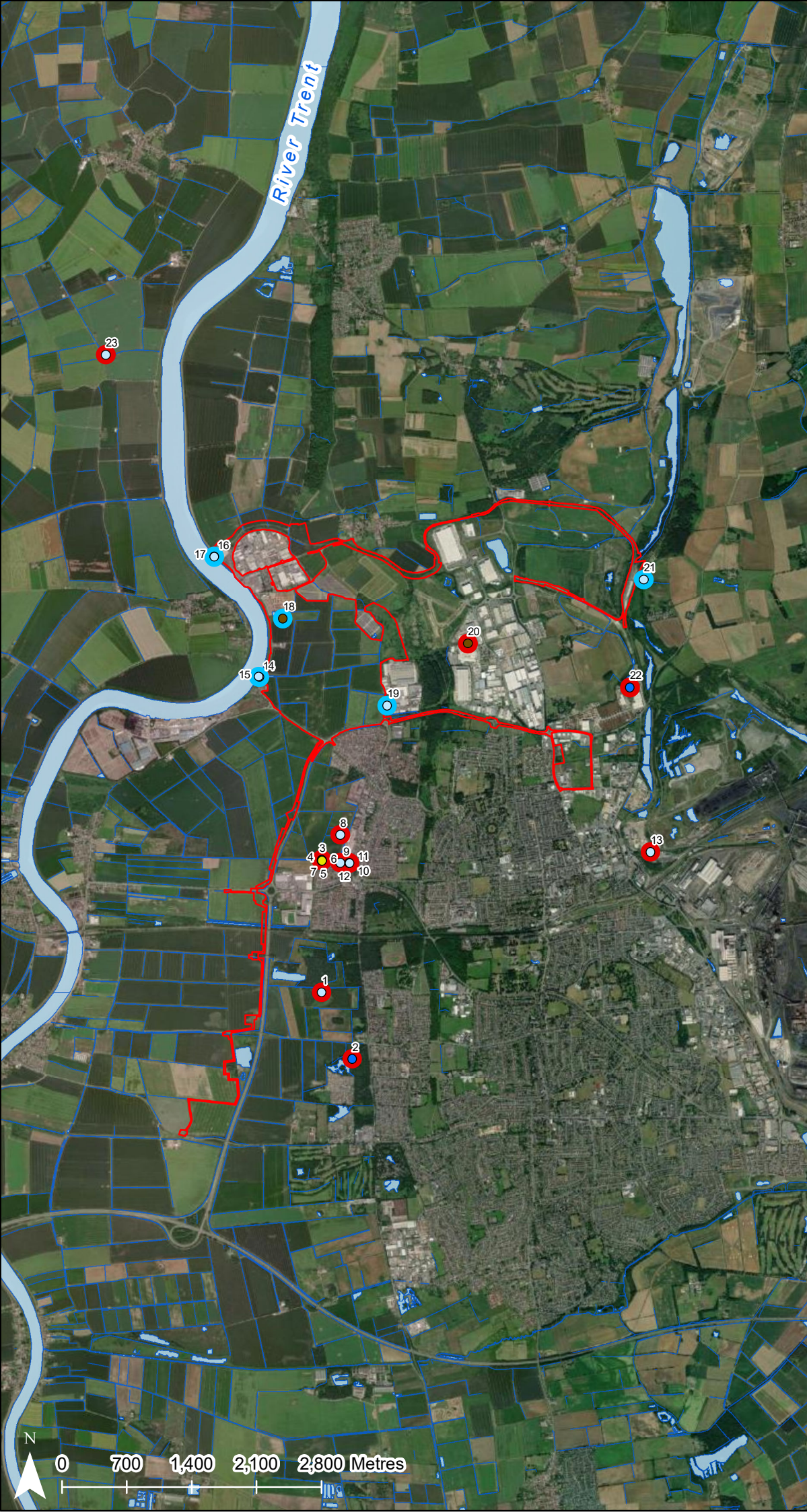
Legend

- Order Limits
- Water Body / Course
- Discharge**
 - Freshwater Stream/River
 - Drain
 - Lake/Reservoir - with outlet
 - Not Supplied
- Hydraulic Connection**
 - In
 - Out

Layer Source Information

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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North Lincolnshire Green Energy Park

Title Figure 4
Abstraction Licences

Client Information

Client North Lincolnshire Green Energy Park Ltd
PINS Proj No EN010116
Date 15/03/2022
Drawn by MTC
Checked by HB
Version P0

Map Information

CRS EPSG 27700
CRS Name British National Grid
Scale 55,000

ArcMap File

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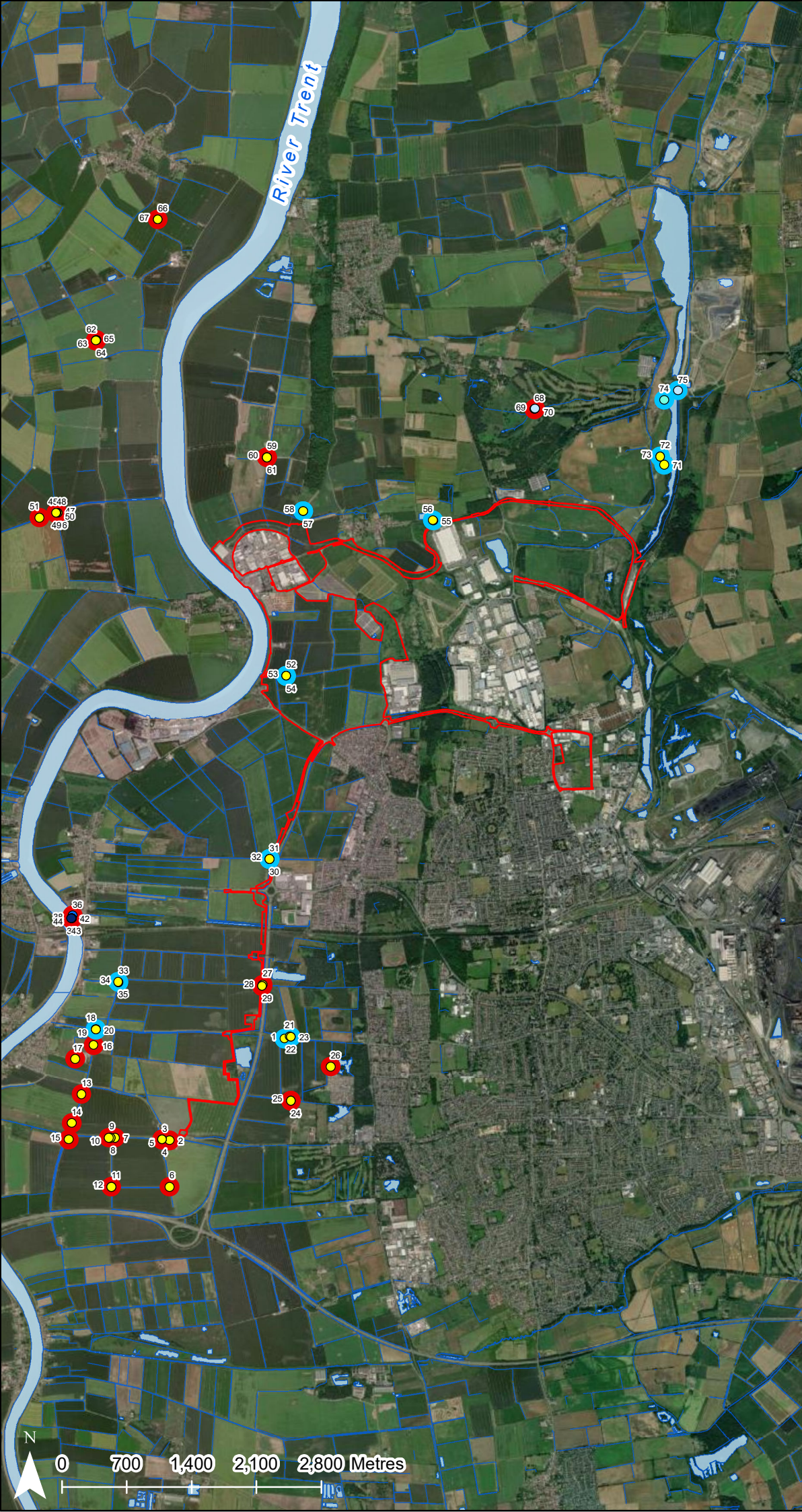
Legend

- Order Limits
 - Water Body / Course
- Abstraction Licences Source**
- Surface
 - Tidal
 - River
 - Stream
 - Catchpit, Catchment Tank or Collecting Tank
- Hydraulic Connection**
- In
 - Out

Layer Source Information

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DO NOT SCALE THIS DRAWING



North Lincolnshire Green Energy Park

Title Figure 5
Flood Areas

Client Information

Client North Lincolnshire Green Energy Park Ltd
PINS Proj No EN010116
Date 15/03/2022
Drawn by MTC
Checked by AG
Version P0

Map Information

CRS EPSG 27700
CRS Name British National Grid
Scale 55,000

ArcMap File

\\UKSSMBNAF-a383.ops.erm55.com\UKSGISData01\London\Confidential Projects\0483091 - Solar 21\MAPS\HYD\ES\HYD_ES_FloodZones_A01.mxd

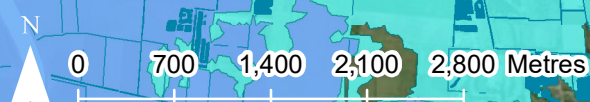
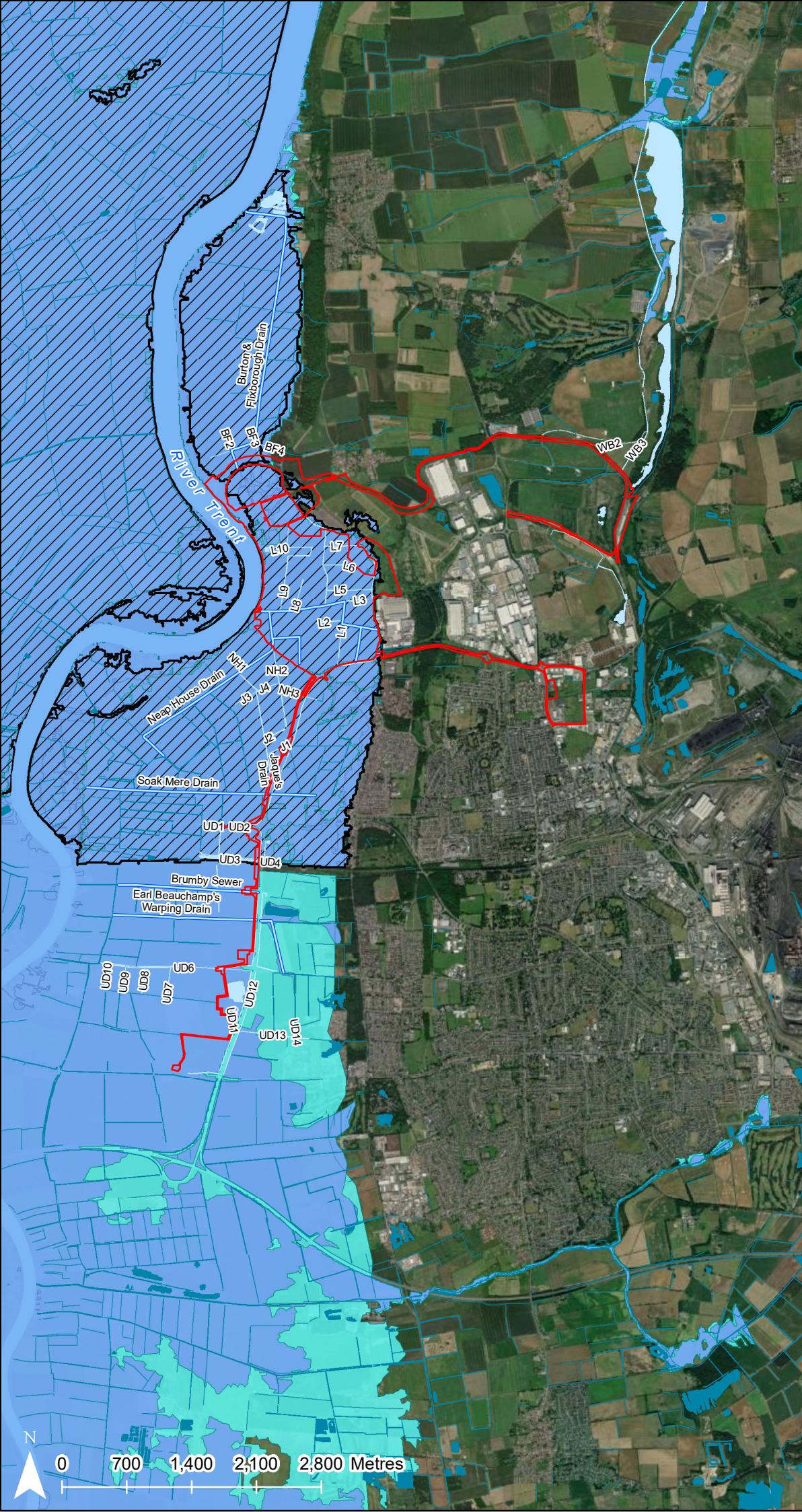
Legend

- Order Limits
- IDB Drains
- Flood Areas**
 - Areas Benefiting from Flood Defences
 - Flood Zone 2
 - Flood Zone 3
- Unnamed Water Body / Agricultural Ditch**
 - Within Assessment
 - Outside Assessment

Layer Source Information

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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North Lincolnshire Green Energy Park

Title Figure 6
Flood Model
Results

Client Information

Client North Lincolnshire
Green Energy Park Ltd
BH Proj No EN010116
Date 15/03/2022
Drawn by MTC
Checked by AG
Version P0

Map Information

CRS EPSG 27700
CRS Name British National
Grid
Scale See Scale Bar

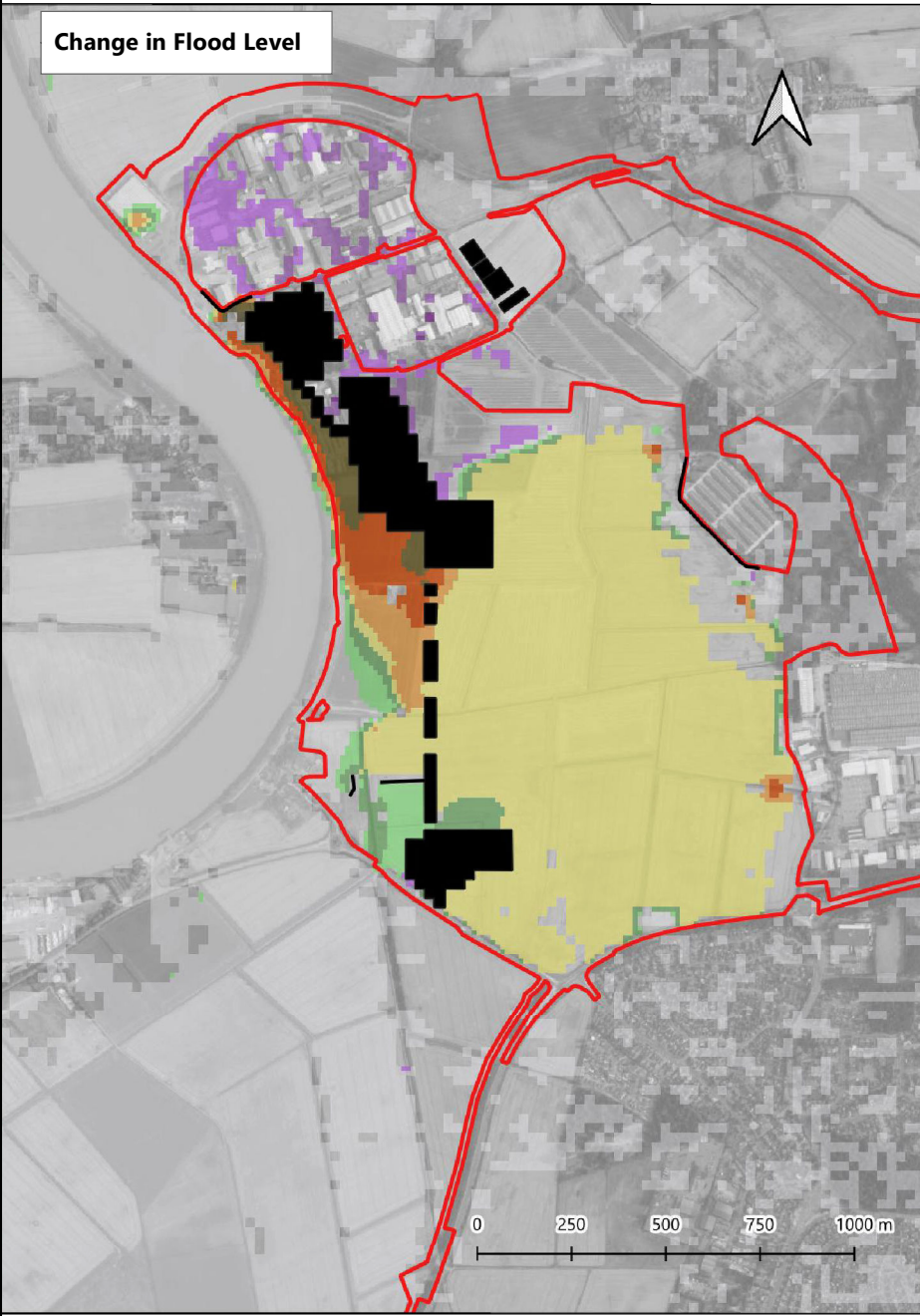
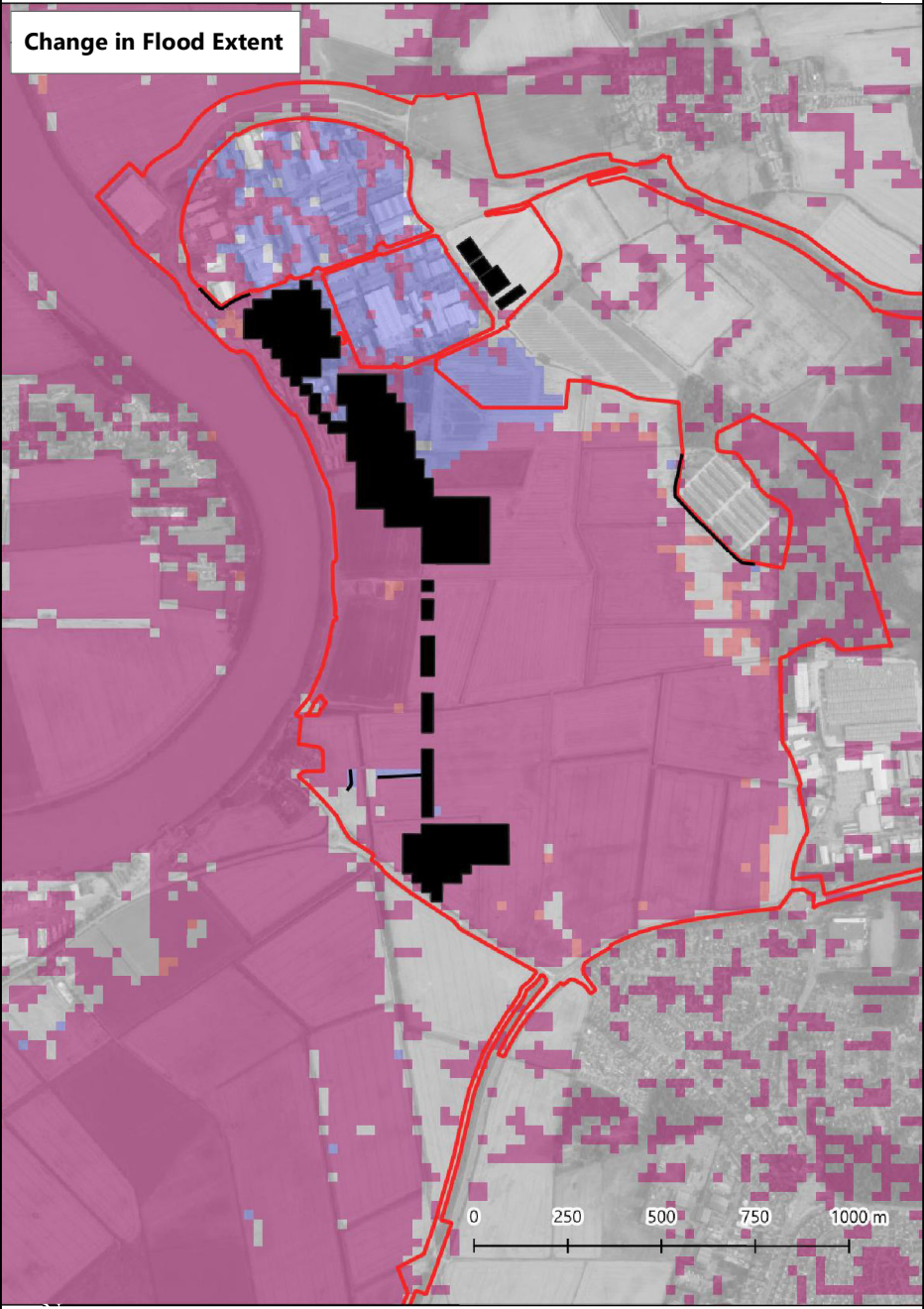
ArcMap File
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HYD_ES_FloodModelResults_A01

Legend

- Order Limits
- Proposed Development
- Proposed Flood Mitigation
- Change in Flood Extent**
- Decrease
- No Change
- Increase
- Change in Flood Level**
- < -1.0m
- 500mm to -1m
- 25mm to -500mm
- 25mm to 25mm
- 25mm to 50mm
- 50mm to 75mm
- 75mm to 100mm
- 100mm to 250mm
- 250mm to 500mm
- 500mm to 1m

Layer Source Information

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North Lincolnshire Green Energy Park

Title Figure 7
Water Courses
Included in the
Assessment

Client Information

Client North Lincolnshire
Green Energy
Park Ltd
PINS Proj No EN010116
Date 13/12/2022
Drawn by MTC
Checked by HB
Version P0

Map Information

CRS EPSG 27700
CRS Name British National
Grid
Scale 55,000

ArcMap File

0483091 - Solar 21\MAPS\HYD\0664595 Maps\
HYD_ES_WaterCourses_A01.mxd

Legend

- Order Limits
- IDB Drains
- Main River
- Unnamed Water Body /
Agricultral Ditch
- Within Assessment
- Outside Assessment

Layer Source Information

Source: Esri, Maxar, Earthstar
Geographics, and the GIS User
Community

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