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12. Water Environment & Flood Risk

12.1. Introduction

12.1.1. This chapter of the Environmental Statement (ES) provides an assessment of likely significant effects on the water environment and flood risk as a result of construction, operational and decommissioning phases of the Proposed Development, as described in **ES Volume I Chapter 4**: The Proposed Development **(Application Document Ref. 6.2)**, hereafter referred to as 'Proposed Development'.

12.1.2. The water environment includes water quality, water resources, hydromorphology, flood risk, and drainage. However, any impacts to the water environment as a result of contaminated land are considered within **ES Volume I Chapter 13**: Geology, Hydrogeology and Land Contamination **(Application Document Ref. 6.2)**. In addition, any impacts to ponds and wetlands are assessed within **ES Volume I Chapter 11**: Biodiversity and Nature Conservation **(Application Document Ref. 6.2)**.

12.1.3. The cumulative effects on the water environment, including flood risk of the Proposed Development, considering other committed developments in the vicinity of the Proposed Development are described in **ES Volume I Chapter 21**: Cumulative and Combined Effects **(Application Document Ref. 6.2)** .

12.1.4. Due to the interdisciplinary nature of effects, this chapter cross references other chapters including **ES Volume I Chapter 8**: Air Quality **(Application Document Ref. 6.2)**, **ES Volume I Chapter 11:** Biodiversity and Nature Conservation **(Application Document Ref. 6.2)** and **ES Volume I Chapter 13:** Geology, Hydrogeology and Land Contamination **(Application Document Ref. 6.2)** and is supported by the following appendices:

- **ES Volume II Appendix 12A**: Flood Risk Assessment (FRA) (including Annex 3 Outline Drainage Strategy) **(Application Document Ref. 6.3)**; and
- **ES Volume II Appendix 12B**: Water Environment Regulations(WER)/Water Framework Directive (WFD) Assessment Report (including Annex 3 - Water Quality Data) **(Application Document Ref. 6.3)**

- **ES Volume II Appendix 12C**: Navigation Risk Assessment (**Application Document Ref. 6.3**).

12.1.5. **ES Volume III Figure 12.1 – Figure 12.5 (Application Document Ref. 6.4)** provide information on surface and groundwater features, ecological designations, and flood risk and the location of the relevant assets.

12.2. Legislation Planning Policy and Guidance

12.2.1. An overview of the legislative and policy context that is relevant to the Proposed Development is provided within **ES Volume I Chapter 7**: Legislative Context and Planning Policy **(Application Document Ref. 6.2)**.

12.2.2. A summary of the legislation and planning policy relevant to the assessment of potential impacts on the water environment from the Proposed Development is provided in this section. These have been taken into account in the assessment, with particular regard given to potential impacts in relation to flood risk and water quality.

Legislation

12.2.3. The following UK Legislation is of relevance to the Proposed Development:

- Floods and Water (Amendment) (EU Exit) Regulations 2019;
- Bathing Water (Amendment) (England) Regulations (HMSO) 2018;
- The Water Environment (Water Framework Directive) (England Wales) Regulations (HMSO) 2017;
- The Conservation of Habitats and Species Regulations 2017;
- Environmental Permitting (England and Wales) Regulations (HMSO) 2016;
- Control of Major Accident Hazards (COMAH) Regulations (HMSO) 2015;
- Environmental Damage (Prevention and Remediation) Regulations (HMSO) 2015;
- Water Act (HMSO) 2014;
- Floods and Water Management Act (HMSO) 2010;
- Eels (England and Wales) Regulations (HMSO) 2009;
- Marine and Coastal Access Act (HMSO) 2009;

- Water Act (HMSO) 2003;
- Control of Substances Hazardous to Health (COSHH) Regulations (HMSO) 2002.
- Control of Pollution (Oil Storage) (England) Regulations (HMSO) 2001;
- Environment Act (HMSO) 1995;
- Land Drainage Act (HMSO) 1991;
- Water Resources Act (HMSO) 1991;
- Water Industry Act 1991;
- Environment Protection Act (HMSO) 1990; and
- Salmon and Freshwater Fisheries Act (HMSO) 1975 (as amended).

12.2.4. Under the various acts and regulations listed above, consents would be required from the Environment Agency for temporary construction and permanent operational abstractions and discharges (i.e. abstraction licenses and bespoke environmental permits), and for certain works affecting main rivers[1] (i.e. flood risk activity permits (FRAP)), as well as any temporary dewatering, abstractions or impoundments and in-channel works related to construction activities (i.e. abstraction, impoundment or transfer licences).

12.2.5. Under the Environmental Permitting (England and Wales) Regulations (2016), a FRAP is required from the Environment Agency if a regulated activity is to be undertaken on or near a main river, on or near a flood defence structure, or in a floodplain[2]. Exemptions do not generally apply; however, the Environment Agency may seek to 'disapply' the requirement for a FRAP where a separate regulatory approval process adequately considers flood risk. Typically, this can include the Marine Licensing assessment and consultation process under the Marine and Coastal Access Act 2009.

12.2.6. Whether assessed by the Environment Agency or considered under a parallel regulatory approval, the scope of the FRAP process includes any activity within 8m of the bank of a main river, flood defence structure or culvert on a main river, or activities carried out on the floodplain of a main river, more than 8m from the river bank, culvert or flood defence structure.

[1] A river maintained directly by the Environment Agency. Main Rivers are often larger watercourses.

[2] Floodplain refers to land adjacent to a watercourse that is subject to flooding

12.2.7. If water is required for construction works, then depending on the source of water, volumes required and duration of abstraction, an abstraction licence may be required from the Environment Agency. This can include dewatering of excavations unless exemptions apply (e.g. for emergency situations) or for small volumes under 20 cubic metres per day (m^3/d). A temporary abstraction licence is required to abstract more than 20 m^3 of water per day lasting less than 28 consecutive days, and a full abstraction licence is required to abstract more than 20 m^3 of water per day for a period of more than 28 days. Any licence issued could contain conditions requiring abstraction to cease at times of low flows or at sensitive times of the year for relevant aquatic ecology, where water is being taken from a watercourse.

12.2.8. Land drainage consent will be required from Lead Local Flood Authority (LLFA) (for the Site - North Lincolnshire Council), or in some cases consent from the Internal Drainage Board (IDB). In this case, the IDB responsible for consent would be the Isle of Axholme and North Nottinghamshire Water Level Management Board (IoAaNNWLMB) which is responsible for certain works that may affect the flow in ordinary watercourses[3] under The Floods and Water Management Act 2010 and The Land Drainage Act 1991.

12.2.9. Refer to the **Schedule of Other Consents and Licences (Application Document Ref. 5.4)** for further detail.

Planning Policy Context

National Policy Statements

12.2.10. The Overarching National Policy Statement (NPS) for Energy (EN-1) (Department of Energy Security and Net Zero (DESNZ), 2023a) is relevant to this assessment with the main sections being:

- Section 4.10: Climate Change Adaptation and Resilience
- Section 4.12: Pollution control and other environmental regulatory regimes;
- Section 5.8: Flood Risk; and
- Section 5.16: Water Quality and Resources.

[3] Ordinary watercourses are defined as all watercourses that are not main rivers

12.2.11. The NPS for Natural Gas Electricity Generating Infrastructure (NPS EN-2) (DESNZ, 2023b) is also of relevance with the main sections being:

- Section 2.3: Climate change adaptation and resilience; and
- Section 2.4: Water Resources (2.4.8 - 2.4.17).

12.2.12. On 24 April 2025, DESNZ published a consultation on revisions to the NPS. Consultation on the amendments closed on 29 May 2025. Based on the published consultation drafts, the revisions to the NPS are not anticipated to result in changes which would materially alter the conclusions as set out in this Chapter.

12.2.13. Table 12.1 provides a summary of relevant NPS advice regarding the water environment and outlines how the item will be addressed within this chapter.

Table 12.1: Summary of relevant NPS advice regarding the water environment

Summary of NPS	Consideration within the Chapter
NPS EN-1	
Paragraph 4.10.13 states: "The Secretary of State should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections and associated research and expert guidance (such as the EA's Climate Change Allowances for Flood Risk available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure, including any decommissioning period."	This Chapter considers the existing status of, and impacts of the Proposed Development on water quality, water resources and physical characteristics of the water environment, taking into consideration climate change impacts. See **ES Volume I Chapter 18:** Climate Change **(Application Document Ref. 6.2)** and **ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)** for further information.

Summary of NPS	Consideration within the Chapter
Paragraph 5.8.36 states "In determining an application for development consent, the Secretary of State should be satisfied that where relevant: • The application is supported by an appropriate FRA • The Sequential Test has been applied and satisfied as part of site selection • A sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk • The proposal is in line with any relevant national and local flood risk management strategy • SuDS have been used unless there is clear evidence that their use would be inappropriate In flood risk areas the project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere • The project includes safe access and escape routes where required, as part of an agreed emergency plan, and that any residual risk can be safely managed over the lifetime of the development.	See **ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)** for further information.

Summary of NPS	Consideration within the Chapter
• Land that is likely to be needed for present or future flood risk management infrastructure has been appropriately safeguarded from development to the extent that development would not prevent or hinder its construction, operation or maintenance."	
Paragraph 5.16.3 states: "Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment, and how this might change due to the impact of climate change on rainfall patterns and consequently water availability across the water environment, as part of the ES or equivalent."	This chapter considers the existing status of, and impacts of the Proposed Development on water quality, water resources and physical characteristics of the water environment, taking into consideration climate change impacts.
Paragraph 5.16.7 states: "The ES should in particular describe: • the existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges; • existing water resources affected by the proposed project and the impacts of	Baseline conditions describing the existing quality of waters (including discharges), water resources (including abstractions), and existing physical characteristics of the water environment have been presented in Section 12.5. The likely impacts and effects of the Proposed Development are assessed in Section 12.7, taking into consideration climate change impacts. A Water Environment Regulations/Water Framework Directive assessment is provided

Summary of NPS	Consideration within the Chapter
the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Abstraction Licensing Strategies) and also demonstrate how proposals minimise the use of water resources and water consumption in the first instance; • Existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics; • Any impacts of the proposed project on waterbodies or protected areas (including shellfish protected areas) under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and source protection zones (SPZs) around potable groundwater abstractions. • How climate change could impact any of the above in the future; and	in **ES Volume II Appendix 12B:** Water Framework Directive Assessment **(Application Document Ref. 6.3)**. Cumulative effects are assessed in **ES Volume I Chapter 21:** Cumulative and Combined Effects **(Application Document Ref. 6.2).**

Summary of NPS	Consideration within the Chapter
• Any cumulative effects."	
NPS EN-2	
Paragraph 2.3.4 states: "The resilience of the project to climate change should be assessed in the ES accompanying an application. For example, climate change impacts on cooling water as a result of higher temperatures should be covered in the impact assessment section on water quality and resources"	See **ES Volume I Chapter 18**: Climate Change **(Application Document Ref. 6.2)**
Paragraph 2.4.30 states: "Where the project is likely to have effects on water quality or resources the applicant should undertake an assessment as required in Section 5.16 of EN-1. The assessment should particularly demonstrate that appropriate measures will be put in place to avoid or minimise adverse impacts of abstraction and discharge of cooling water."	This chapter considers the existing status of, and impacts of the Proposed Development on water quality, water resources and physical characteristics of the water environment. Mitigation of construction, operational and decommissioning impacts is discussed in Section 12.8.

UK Marine Policy Statement

12.2.14. The Marine Policy Statement (MPS) (Department for Environment, Food & Rural Affairs (DEFRA), 2011a) is the framework for preparing Marine Plans and taking decisions affecting the marine environment. It establishes a vision for the marine environment, which is for 'clean, healthy, safe, productive and biologically diverse oceans and seas'. The MPS underpins the process of marine planning, which establishes a framework of economic, social and environmental considerations that will deliver these high-level objectives and ensure the sustainable development of the UK marine area.

12.2.15. The East Inshore and East Offshore Marine Plans (DEFRA, 2014) establishes the plan led system for the marine area in which the riverine parts of the Site are located. Both the MPS and the East Inshore Marine Plan are discussed further in **ES Volume I Chapter 7:** Legislative Context and Planning Policy **(Application Doc Ref. 6.2)**.

National Planning Policy Framework

12.2.16. The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government (MHCLG) 2024), has three overarching objectives to contribute to the achievement of sustainable development, one of which is the 'environmental objective'. This objective includes the requirement "to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy" (Paragraph 8c).

12.2.17. The NPPF also contains a number of statements which are relevant to the water environment. These include:

- The need to mitigate and adapt to climate change should also be considered in preparing and assessing planning applications, taking into account the full range of potential climate change impacts (paragraph 163);
- New development should be planned for in ways that:
  - avoid increased vulnerability to a range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures,

including through incorporating green infrastructure and sustainable drainage systems;
  - help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of building in plans should reflect the Government's policy for national technical standards (paragraph 164); and

- Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere (paragraph 170);
- A sequential risk-based approach should also be taken to individual applications in areas known to be at risk now or in future from any form of flooding, by following the steps set out below (paragraph 173);
- Within this context the aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test (paragraph 174);
- The sequential test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk) (paragraph 175);
- Having applied the sequential test, if it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification (paragraph 177);

- The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that:
  - the development would provide wider sustainability benefits to the community that outweigh the flood risk; and
  - the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall (paragraph 178);
- Both elements of the exception test should be satisfied for development to be allocated or permitted (paragraph 179);
- When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:
  - a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
  - b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;
  - c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
  - d) any residual risk can be safely managed; and
  - e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan (paragraph 181);
- Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity.

Sustainable drainage systems provided as part of proposals for major development should:

  - a) take account of advice from the Lead Local Flood Authority;
  - b) have appropriate proposed minimum operational standards; and
  - c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development (paragraph 182); and

- Planning policies and decisions should contribute to and enhance the natural and local environment by:

  - preventing new and existing development from contributing to, being put at unacceptable risk from or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve the local environment conditions such as air and water quality, taking into account relevant information such as river basin management plans. (paragraph 187e).

National Planning Practice Guidance

12.2.18. National Planning Practice Guidance (NPPG) (MHCLG, 2019) Water supply, wastewater and water quality provides guidance for local planning authorities on assessing the significance of water environment effects of proposed developments. The guidance highlights that adequate water and wastewater infrastructure is needed to support sustainable development.

12.2.19. The NPPF and the Flood Risk and Coastal Change guidance within the NPPG (MCHLG, 2022) provides guidance on assessment of flood risk effects and requirements for appropriate management of flood risks to and from development, taking account of the impacts of climate change.

Defra's '25 Year Environment Plan'

12.2.20. In 2018, Defra published the 25 Year Environment Plan (DEFRA, 2018) setting out the UK Government's goals for improving the environment within a generation and leaving it in a better state than we found it. The plan covers the provision of clean water; protection and enhancement of habitats, reducing the risk from environmental hazards and mitigating and adapting to climate change; using resources more sustainable and

efficiently, managing exposure to chemicals and engagement with the natural environment. The Environmental Improvement Plan (EIP) 2023 is the first revision of the plan, building upon the vision to set out how the environmental goals will be delivered.

12.2.21. The Plan includes specific goals to achieve good environmental status in our seas, reduce the environmental impact of water abstraction, meet the objectives of RBMP under the WFD implemented in England by the Water Environment (Water Framework Directive) (England Wales) Regulations 2017 reduce leakage from water mains, improve the quality of bathing waters, restore protected freshwater sites to a favourable condition, and do more to protect communities and businesses from the impact of flooding, coastal erosion and drought. At the heart of the Plan's delivery is the natural capital approach with the aspiring goal of a net gain in biodiversity from new development.

Future Water, The Government's Water Strategy for England

12.2.22. 'Future Water - The Government's Water Strategy for England' (DEFRA, 2011b) sets out the Government's long-term vision for water and the framework for water management in England. It aims to enable sustainable and secure water supplies whilst ensuring an improved and protected water environment. 'Future Water' brings together the issues of water demand, supply and water quality in the natural environment as well as surface water drainage and river/ coastal flooding into a single coherent long-term strategy, in the context of the need to reduce greenhouse gas emissions.

12.2.23. The water environment and water quality have great economic, biodiversity, amenity and recreational value, playing an important role in many aspects of modern-day society, and thus the functions provided must be sustainably managed to ensure they remain available to future generations without compromising environmental quality.

Plan for Water: our integrated plan for delivering clean and plentiful water

12.2.24. The plan for water policy paper (DEFRA, 2023a) is designed to bring together steps undertaken already together with new action to transform management of the water system and deliver cleaner water for nature and people, and secure a plentiful water supply, in line with the goals and targets in the Environmental Improvement Plan (DEFRA, 2023b)

National Framework for Water Resources

12.2.25. The National Framework for Water Resources (EA, 2025a) identifies the essential actions needed to meet the challenges of water scarcity at a national, regional and catchment scale. The framework builds upon the original 2020 framework and takes steps to strengthen multi-sector water resources planning. Section 7 of the framework includes recommendations for the energy sector, due to the large quantities of water needed for energy production, with the Environment Agency estimating the water needs for CCS and hydrogen production alone may amount to 767 megalitres per day by 2050.

Cooling Water Abstraction

12.2.26. There are a number of sources of guidance relating to optimal operation of direct cooled and cooling tower-cooled power stations in coastal and estuarine UK environments including 'Screening for Intake and Outfalls: a best practice guide' (Environment Agency, 2005) that have been considered, where appropriate, in the design development process for the Proposed Development . Other relevant guidance considered in the Best Available Techniques (BAT) assessment for cooling technology includes:

- EU Best Available Techniques (BAT) Reference Document for Large Combustion Plants (August 2017);
- EU Reference Document on the application of Best Available Techniques to Industrial Cooling Systems (December 2001); d
- Environment Agency: Understanding the environmental impact of cooling water systems (June 2024); and
- Environment Agency: Risk assessments for your environmental permit (January 2025b);

12.2.27. The choice of cooling technique and the associated water source has been selected considering the BAT hierarchy and evaluating the efficiency benefits and environmental effects of the different techniques available. An Assessment of BAT for Energy Efficiency will be completed in support of the Environmental Permit Application for the Proposed Development.

Sustainable Drainage Systems Guidance

12.2.28. Planning policy encourages developers to include sustainable drainage systems (SuDS) in their proposals where practicable. SuDS provide a way to attenuate runoff from a site to the rate agreed with the Environment Agency to avoid increasing flood risk, but they are also

important in reducing the quantities and concentration of diffuse urban pollutants found in the runoff.

12.2.29. DEFRA published 'National standards for sustainable drainage systems (SuDS) in 2025 (DEFRA, 2025).

12.2.30. The standards set out a series of standards in relation to managing runoff quantities and quality, together with standards in relation to amenity and biodiversity. The standards identify that the peak runoff rates should be as close as is reasonably practicable to the greenfield rate but should never exceed the pre-development runoff rate. The standards also set out that the drainage system should be designed so that flooding does not occur on any part of a development site for a 1 in 30 year rainfall event, and that no flooding of a building (including basement) would occur during a 1 in 100 year rainfall event. It is also noted within the standards that pumping should only be used when it is not reasonably practicable to discharge by gravity.

12.2.31. Industry good practice guidance on the planning for and design of SuDS is provided by:

- C753 - The SuDS Manual (Construction Industry Research and Information Association (CIRIA), 2015);
- Design Manual for Roads and Bridges (DMRB) (Highways England, 2021) – CD 532: Vegetated Drainage Systems for Highway Runoff; and
- DMRB CG 501: Design of Highway Drainage Systems (Highways England, 2022).

River Basin Management Plan

12.2.32. River Basin Management Plans (RBMP) are prepared by the Environment Agency for six-year cycles and set out how organisations, stakeholders and communities will work together to improve the water environment. The most recent plans were published in 2022 (the third cycle) and will remain in place until after 2027. The waterbodies within the study area fall under the Trent Lower and Erewash and Idle and Torne Management Catchments within the Humber RBMP (Environment Agency, 2022). Further details are provided in the **ES Volume II Appendix 12B:** WFD Assessment (**Application Document Ref. 6.3**).

Local Planning Policy

12.2.33. The Proposed Development is within the administrative area of North Lincolnshire Council. The existing North Lincolnshire Local Development Framework (North Lincolnshire Council, 2011a) includes the following saved policies that are of relevance to the water environment:

- CS16: North Lincolnshire's Landscape, Greenspace and Waterscape – Requirement for development proposals to improve and address local deficiencies in the quality and quantity of accessible landscape, greenspace and waterscape, where appropriate;
- CS17: Biodiversity - Stewardship of North Lincolnshire's wildlife will be promoted through safeguarding protected sites, maintaining a network of local sites and corridors, ensuring development retains, protects and enhances biological features and ensuring development seeks a net gain in biodiversity;
- CS18: Sustainable Resource Use and Climate Change – Development will need to meet high water efficiency standards, incorporating new technology to recycle and conserve water. SuDS should be used where possible. The council will prevent development in high flood risk areas wherever possible and practicable. The council will ensure that development and land use in areas close to rivers responds appropriately to the character of the area, in the interests of preserving and making best use of limited resources; and
- CS19 Flood Risk - 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. 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; and
  - an FRA has demonstrated that the development will be safe, without increasing flood risk elsewhere by integrating water

management methods into development. In addition, the development will be required, wherever practicable, to incorporate SuDS to manage surface water drainage.

12.2.34. North Lincolnshire Council intends to carry out initial engagement on the New North Lincolnshire Local Plan in Spring 2025, followed by two further consultations on full draft versions of the Plan prior to being submitted for Examination in Public by the Planning Inspectorate in Spring 2026 It is not expected that any amendments to the Lincolnshire Local Plan will impact the findings of this Chapter.

North Lincolnshire Council's SuDS and Flood Risk Guidance Document

12.2.35. North Lincolnshire Council, as LLFA, has produced a SuDS and Flood Risk Guidance Document Supplementary Guidance Document (SGD) (North Lincolnshire Council, 2017) providing developers and designers with guidance on SuDS and guidance on what type of SuDS are appropriate to a particular development, depending on the size and location. It also provides advice regarding adoption and maintenance of SuDS, riparian responsibilities and specific North Lincolnshire Council requirements. Additional guidance in relation to the SGD is provided in **ES Volume II Appendix 12A (Application Document Ref. 6.3)** and other sources of regional guidance including:

- North Lincolnshire Preliminary Flood Risk Assessment (PFRA);
- North and North East Lincolnshire Strategic Flood Risk Assessment (SFRA); and
- North Lincolnshire Council Local Flood Risk Management Strategy (LFRMS).

Isle of Axholme and North Nottinghamshire Water Level Management Board Byelaws

12.2.36. IDB operate in the low lying fen and valley areas, maintaining pumping stations and drainage channels to ensure that people are safe, and the risk of flooding is greatly reduced. The IoAaNNWLMB (the IDB) covers an area of 28,737ha running from the Ouse following the west bank of the Trent moving south-west down to Markham Moor.

12.2.37. The Isle of Axholme and North Nottinghamshire Water Level Management Board Byelaws and Land Drainage Act 1991 allow the Board to take action to ensure that free flow of water is unrestricted. The IDB jurisdiction in relation to the study area and Site includes areas of relevant ordinary watercourses north of the Stainforth and Keadby

Canal as shown on **ES Volume III Figure 12.5:** Internal Drainage Board Assets **(Application Document Ref. 6.4)**. Watercourses south of the Stainforth and Keadby Canal within the study area are not maintained by any IDB. Watercourses maintained by the Board are cleaned out annually and it is important that access is preserved for machinery to enable this work to be undertaken. The Board's Byelaws prevent the erection of any building, structure (whether temporary or permanent) or planting of trees/ shrubs etc. within nine metres either side of a Board maintained watercourse irrespective of any planning permission. The Board's consent will be required to undertake works such as:

- works in, over, under or within nine metres of a Board maintained watercourse;
- installation of a culvert, weir or other like obstruction within any watercourse; and
- any works that increase the flow of surface water or treated foul effluent to any watercourse within the Board's district.

12.3. Assessment Methodology

Consultation

12.3.1. Consultation is integral to the EIA process, and is ongoing with statutory and non-statutory stakeholders, as outlined in the **Consultation Report** (**Application Document Ref. 5.1)**.

12.3.2. The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments, relevant to Water Environment and Flood Risk via the formal Scoping Opinion (**ES Volume II Appendix 1B (Application Document Ref. 6.3))** and in response to the Statutory Consultation are outlined in **Table 12.2**.

Table 12.2: Summary of consultation responses that have informed the scope and methodology of the water environment assessment

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
Targeted Consultation on Amendments			
North Lincolnshire Council LLFA	April 2025 Target Consultation	The LLFA raised a number of comments in relation to the Flood Risk Assessment. Key comments included: – Updated flood data (NAFRA2) available – Expectation that all critical infrastructure and manned buildings will be situated above the critical flood level as standard, with additional mitigation incorporated to manage residual flood risk and long-term resilience. – Flood resilience is a priority issue. Investment in improved drainage and strategic flood defences as part of this scheme would benefit the development site and wider area. – Detailed comments on drainage cannot be provided in absence of a formal drainage design. A comprehensive	The Flood Risk Assessment **ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)**) provides responses to the LLFA comments in relation to flood risk.

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		surface water drainage strategy will be required, demonstrating how flows across and beyond the site will be managed, with appropriate hydraulic modelling in place. This should account for a range of design storm events and incorporate upper end climate change allowances. – LLFA expects inclusion of SuDS to support flow control, enhance water quality and deliver long-term sustainability benefits.	
Statutory Consultation			
Doncaster East Internal Drainage Board (DEIDB)	February 2025 Statutory Consultation Response	Confirmed that DEIDB have no comments or objections to make on the proposed development. Site is contained wholly within the Isle of Axholme and North Nottinghamshire Water Level Management Board Area	DEIDB's position is noted. Impacts on IoAaNNWLMB waterbodies considered in assessment.
Severn Trent Water	February 2025 Statutory	Severn Trent Water noted that they have assets within the Site (water discharge corridor). Severn Trent provided details on provisions that must be	No works are proposed in the vicinity of Severn Trent assets. Protective provisions have been outlined for water company assets that may be

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
	Consultation Response	adhered to if working in the vicinity of their assets.	impacted in the **Draft DCO** (**Application Document Ref. 3.1**).
IoAaNNWLMB	February 2025 Statutory Consultation Response	IoAaNNWLMB provided details on consent requirements, and confirmation that surface water run-off rates to receiving watercourses must not be increased as a result of the development.	Consents for any works to, or in the vicinity of the IDB watercourses will be obtained, in line with the provided guidance. See the Outline Drainage Strategy (Annex 3 of **ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)**) for details on the drainage design which will maintain runoff at greenfield rates.
Environment Agency	February 2025 Statutory Consultation Response	The EA raised a number of comments in relation to flood risk and modelling, water resources and the WER compliance assessment. Headline issues noted by the EA include: – Flood risk of the proposals have not been appropriately assessed, and mitigation may not be appropriate as risks aren't understood. Full details of the proposed replacement of Mabey Bridge have not	The Flood Risk Assessment **ES Volume II Appendix 12A (Application Document Ref. 6.3.16)**) has been updated in line with comments from the EA and subsequent engagement. Further details on water supply during construction have been discussed in the Outline Water Management Plan appended to the **Outline CEMP**

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		been submitted. Full details of culverting, infilling and access bridges on non-main river watercourses should be fully detailed in the Flood Risk Assessment – Risk of increasing flood risk if land raising remains in place. – Inappropriate consideration of water supply may cause delays for the proposed development. Water supply has not been considered for the construction phase. Lack of consideration of limits during prolonged periods of dried weather.	(**Application Document Ref. 7.4**). Engagement will continue with stakeholders on water demand and supply, during detailed design.
Anglian Water	February 2025 Statutory Consultation Response	Confirmed no further comments following removal of abstraction from Trent option, but would like to remain notified of the project going forward in case position changes in respect of points raised.	Anglian Water's position is noted.
Canal and River Trust	February 2025 Statutory	Reiterated scoping opinion comments that are to be addressed in Environmental Statement:	See the Flood Risk Assessment (**ES Volume II Appendix 12A (Application Document Ref. 6.3)**) that considers

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
	Consultation Response	– Flood risk, where we identified that flooding from the Stainforth & Keadby Canal is a potential risk, as excess flows could enter the canal from the River Don. – Impacts of the temporary cofferdam on water flows in the canal	flood risk in relation to the Canal and impacts relating to cofferdams or other construction works.
Scoping Stage			
Planning Inspectorate	June 2024 Scoping Opinion	*6.5.1.2 Study area - receptors:* The distance of the identified waterbodies from the Site is generally not stated. It would aid understanding of the baseline if this information was included in the ES.	A number of figures are provided to aid understanding of the proximity of receptors to the Proposed Development. Distances have been provided to receptors such as licensed abstractions.
		6.5.1.2 Assessment – sediment mobilisation: *In relation to contaminant concentrations found in sediment it is stated that PAH are the only substance group identified as of 'potential concern' (2017), based on river Trent sediment sampling data obtained from the MMO. It is explained that further interpretation of sediment sampling data will be presented in the PEI*	Sediment mobilisation arising from Abnormal Indivisible Loads (AIL) is identified as a potential impact in Section 12.7. Further details on measures to monitor and mitigate any potential impacts are outlined in the **Outline CEMP** (**Application Document Ref. 7.4**).

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		Report. The potential for construction and operational works to change sediment quality and mobilise sediments and give rise to impacts on sensitive receptors should be considered in the ES. This should include potential changes arising from vessel movements during construction, in the event that Abnormal Indivisible Loads (AIL) are delivered on waterborne transport via the River Trent. The ES should include an assessment of the potential for significant effects.	
		6.5.1.3 Study area – receptors: *The River Trent, Humber Estuary Ramsar site, Special Area of Conservation (SAC) and SSSI are identified as receptors. The Humber Estuary Special Protection Area (SPA) is not mentioned although it is identified elsewhere in the Report as 9.1km downstream of the Site and connected to the Proposed Development via the River Trent. Consideration should also be given to the potential for impacts on the SPA arising from the River Trent acting as a hydrological pathway and*	Details regarding environmental designations within the area are provided in **ES Volume I Chapter 11:** Biodiversity, Ecology and Nature Conservation (**Application Document Ref. 6.2**). Designated sites relevant to the water environment are illustrated in **ES Volume III Figure 12.4:** Ecologically Designated Sites Relevant to the Water

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		the ES should include an assessment of significant effects where they are likely to occur.	Environment **(Application Document Ref. 6.4).** For the purposes of the water environment assessment, a study area of approximately 1km from the Site has been considered in order to identify surface and groundwater receptors that could reasonably be affected by the Proposed Development. However, since water flows and water quality impacts may propagate downstream, where relevant the assessment also considers a wider study area based on professional judgement. Professional judgement has been applied to identify the extent to which such features are considered. In this instance, the Proposed Development lies adjacent to the tidal River Trent (Humber Upper WER waterbody). Given the size and length of the River Trent, it is unlikely that any further waterbodies downstream would be affected and thus

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
			the River Trent is considered the final receiving waterbody that could conceivably be affected.
		6.5.1.4 Baseline – flood risk The report states that the entire Site and surrounding environs (other than a small, slightly elevated area) is within Flood Zone 3 (FZ3). The description suggest that this refers to FZ3a (i.e. land with a High Probability of flooding), however it is not specified. The Inspectorate is aware that the Environment Agency Flood Map does not distinguish between FZ3a and 3b.	**ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)** distinguishes between Flood Zone 3a and 3b.
		6.5.1.4 Baseline – flood risk *Para 6.5.1.4 states that historical data indicates that the Site is not at risk from groundwater flooding based on the geological setting of the wider area encompassed by Keadby 1 and Keadby 2 Power Stations, but also that groundwater flooding is understood to be*	This is clarified in **ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)**

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		effectively managed via a well-developed drainage system serving these power stations. The latter statement appears to suggest that there is a risk of groundwater flooding. This should be clarified in the ES.	
		6.5.1.4 Assessment – cross-referencing The Inspectorate welcomes that a Flood Risk Assessment (FRA) and a Water Framework Directive (WFD) Assessment will be submitted with the DCO application. Cross-references from the ES to these documents should explicitly identify the location therein of information relevant to the assessment of impacts on the water environment. The Applicant is referred to the comments of the Environment Agency in relation to the design period used for the purpose of the FRA, the scenarios that should be considered and relevant flood models (Appendix 2 of this Opinion).	The chapter cross references **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**) and **Appendix 12B**: WFD Assessment (**Application Document Ref. 6.3**) where relevant. Environment Agency comments responded to below.
		6.5.2.1 Assessment – potential impacts	Potential impacts on flows and levels in the Keadby Canal and River Don are

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		No reference is made in the Report to the relationship between the River Don and the Stainforth and Keadby Canal, which is fed by the Don. The Applicant is referred to the comments of the Environment Agency (Appendix 2 of this Opinion) in relation to potential changes in flow levels of the canal as a result of the Proposed Development and potential impacts arising from that. Neither does the Report reference the risk of flooding from the canal due to excess flows from the River Don. The ES should consider such impacts and include an assessment of significant effects where they are likely to occur and propose suitable mitigation.	discussed in **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3).** See paragraphs 12.3.21 and 12.3.22 for further detail on the Stainforth and Keadby Canal abstraction from the Don.
		6.5.2.2 Baseline – data provision It is stated that information from previous assessments at the Site will be used to confirm potential receptors and establish the baseline. No additional water quality sampling and analysis is proposed on the basis that existing, freely available data should be sufficient (although this will be kept under review). The	Information from previous assessments at the site has been used as the initial basis of the assessment, but with data updated where more recent information is publicly available or from site surveys. The Applicant has ensured that the baseline is appropriate to allow the

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		Applicant should seek to agree this approach with relevant consultees and it should be justified in the ES. The Applicant should ensure that the baseline is sufficiently robust to allow the assessment of significant effects to be undertaken.	assessment of significant effects to be undertaken.
		6.5.2.2 Assessment – effluent streams and discharges *The ES should clearly describe the effluent streams and discharges to water associated with construction and operation of the Proposed Development and any permits required/implications for existing permits. Effort should be made to agree the scope and methodology of assessment work, including water quality modelling, with relevant consultation bodies. Evidence of discussions and any agreements reached should be provided within the ES.*	Table 12.3 outlines abstraction and discharge requirements.
		6.5.2.1 Assessment – construction	Potential impacts from cofferdam installation in the Stainforth and Keadby

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		Should use be made of cofferdams in the Stainforth and Keadby Canal during construction of the proposed abstraction infrastructure the ES should consider potential impacts on water flow and provide an assessment where significant effects are likely to occur.	Canal is considered within the chapter and **ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)**.
		6.5.2.1 Assessment – waterborne transport *Section 2.1 of the Report states that construction AIL may be delivered to the Site by waterborne transport via the River Trent, however no reference is made to this possibility in this aspect section. Should this be presented as an option in the DCO application the ES should consider any potential impacts an include an assessment of significant effects where they are likely to occur.*	Potential impacts from waterborne transport (such as sediment mobilisation and spillages) are considered in Section 12.7. Control measures are outlined within the **Outline CEMP (Application Document Ref. 7.4)** and **Appendix 12C:** Navigation Risk Assessment **(Application Document Ref. 6.3)** to mitigate against potential impacts from waterborne transport.
		6.5.2.2 Consultation *Anglian Water should be consulted in addition to the bodies highlighted within this section of the*	Anglian Water was previously consulted in relation to potential abstraction from the Trent (Humber Upper WER waterbody), which has now been

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		Report in relation to baseline data and the scope of the assessment.	discounted. Anglian Water have been informed of the change to the design (see Anglian Water Statutory Consultation response above).
Anglian Water	June 2024 Scoping Opinion	Anglian Water does not consider that sufficient information has been provided to reach a conclusion on the project impacts regarding water supply. Impacts of climate change in terms of water availability for the construction, operation and decommissioning stages is also of relevance. There is a need, therefore, to further establish and set out in more detail how the project will be supplied with water and if connections to any networks are required. Also, how water assets serving residents and business will be protected and how the design has been altered to reduce the need for new water infrastructure or the diversion of existing assets. Anglian Water requests that these points are covered in the EIA. Anglian Water now advise that new non-household water supply requests (construction	Impacts of the project on water resources are considered within this Chapter, taking into consideration climate change. A qualitative assessment has been undertaken, which will be reviewed as further design and construction details are developed. Based on the existing licences/consents in place, it is considered that the Proposed Development can be sufficiently supplied with water. The potential Trent (Humber Upper WER waterbody) abstraction noted within the scoping report, which had the potential to impact Anglian Water's abstraction, has been discounted.

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		and operational phases) may be declined as these could compromise our regulatory priority of supplying existing and planned domestic growth. The flows needed to fill water storage tanks for example (if rainwater harvesting on site is not used to meet non-potable demand) will need to be assessed by Anglian Water to advise whether a supply is feasible, when assessed in terms of the potential to jeopardise domestic supply or at a significant financial or environmental cost. Our new position on non-household supply is due to our joint aim with the Environment Agency of reducing abstraction to protect sensitive environments. To support appropriate water resource planning, Anglian Water now requires that significant new non-domestic water demands be set out in a Water Resources Assessment (WRA). For applications under the 2008 Act the WRA (or its summary) should form part of the EIA sufficient to enable regulators including the Environment Agency to advise the Examining Authority and the Secretary of State	The Applicant will continue to engage with all relevant stakeholders on abstraction/ supply and discharge requirements including (but not limited to) Yorkshire Water (mains supply), Severn Trent (foul water), Canal & River Trust (canal water abstraction) and Environment Agency (construction and operational abstractions and discharges).

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		that the supply of water to the project is deliverable and sustainable. A WRA would include setting out a daily demand for each stage of the project and whether this is for domestic or nondomestic uses.	
		We note that at Section 8.1. 'EIA Methodology and Reporting of the Scoping Report', the project plans to engage with several consultees. We would consider that Anglian Water should be included on the list of consultees to be drawn up by the applicant to follow their proposed approach to assessment and consultation. Anglian Water would welcome the instigation of discussions with SSE Thermal and Equinor prior to the project layout and initial design and to assist the applicant before the submission of the Draft DCO for examination	Anglian Water's consultation response was primarily in relation to potential abstraction from the Trent (Humber Upper WER waterbody), which has now been discounted. The Applicant has contacted Anglian Water to advise that river abstraction is no longer required so no further consultation is needed (see Anglian Water statutory consultation response above).
Canal & River Trust	June 2024 Scoping Opinion	Section 6.5.1.4 does not specifically address risks of flooding from the Stainforth and Keadby Canal. This waterway is fed water from the River Don, and excess flows could enter the canal and	Refer to **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**) where flood risks

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		result in an increased risk of flooding downstream. Unlike canals fed by reservoirs and sluices, the Trust has less control over the water levels in the canal. We consider that the further desk-based assessment identified in this section should include consideration of the potential flood risk from the navigation. This could include level checks and a full assessment made of existing flood protection along the canal.	from/to the Canal are considered within the Flood Risk Assessment.
		6.5.2.1 identifies that temporary changes to the flows and water levels of watercourses could occur during the construction phase of the development. We wish to highlight that the use of coffer dams in the Stainforth & Keadby Canal to facilitate the construction of abstraction equipment may affect water flows, and the impact may require some assessment.	A qualitative assessment has been undertaken, based on proposed embedded and best practice mitigation measures, which indicates no significant effects. Potential impacts on flows and levels in the Keadby Canal and River Don are discussed in the Flood Risk Assessment in **ES Volume II Appendix 12A** (**Application Document Ref. 6.3**).

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		6.5.2.2 confirms that the scope of the assessment will include a review of the abstraction licences, available abstraction headroom and the impact on species from the abstraction. The Trust take no issue with this approach. The trust has been in discussion with the promoter on the abstraction works. A revised abstraction license would likely be required for the abstraction sought. We understand an existing abstraction licence is in place to allow for the Keadby CCS Power Station project (as a variation to an existing licence for the Keadby 2 project). On the presumption that the Keadby Next Generation project substitutes the Keadby CCS Power Station project (and only one of the two projects is progressed), we understand from discussions that no additional water abstraction would be required beyond what is required for the Keadby CCS Power Station project. As a result, appropriate water resources are likely to be available.	Refer to paragraphs 12.3.21 and 12.3.22 in relation to the Stainforth and Keadby Canal abstraction.

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		Please note that offsite canal improvement works may be required to provide appropriate water supply. Works to Keadby Lock are referred to in paragraph 6.8.1	
Environment Agency	June 2024 Scoping Opinion	**Flood risk** The site lies mostly within Flood Zone 3 (fluvial and tidal) and is therefore considered to be at high risk of flooding. We will therefore expect the application to be supported by a detailed site-specific flood risk assessment (FRA). We note that the site is proposed to operate for a period of 25 years (Section 3.7). For the FRA's purpose, a design period of 75 years should be used to assess the potential impacts of climate change and to inform relevant flood mitigation measures. Flood risk will need to consider the following scenarios: • breach • overtopping • climate change scenarios	Refer to **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3)**.

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		The decommissioning phase needs to be scoped in for Water Environment and Flood Risk. Section 6.5.2.1 states *"impacts on the water environment and flood risk, as a result of decommissioning...will not be separately assessed...on the bases the effects of decommissioning are likely to be similar to or no worse than the effects from construction"* The level of flood risk to the development will increase over its lifetime; therefore there will need to be consideration of this within the FRA, to ensure decommissioning works do not increase flood risk on site or elsewhere. The FRA should include suitable flood risk mitigation measures, considering the safety of the site users. The occupation and operation of the site will need to be confirmed, in order to establish necessary onsite refuge and safe evacuation of the site in the event of a flood event. We would encourage early discussion with the Environment Agency in terms of the scope and requirements of the FRA, as well as availability	

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		and requirements for flood modelling and climate change assessments. The North Lincolnshire Strategic Flood Risk Assessment (SFRA) should be reviewed, with particular attention to the Critical Flood Level which has been established for the Isle of Axholme.	
		Flood modelling Please note for Section 6.5.1.4, the latest hydraulic model for the Tidal Trent was undertaken by Jacobs in 2023. This should form a good basis for informing the Flood Risk Assessment (FRA). It is appreciated that separate modelling may have already been developed for this site, which may be appropriate to use if it uses the most up to date information, or it can be demonstrated that it is conservative with respect to the Tidal Trent (Jacobs, 2023) modelling. With regards to the Tidal Trent (Jacobs, 2023) modelling, this is a Flood Modeller-TUFLOW	Refer to **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**). Updated hydraulic modelling has been undertaken for the Proposed Development, using the latest available data.

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		model which adopts a 25 meter 2d grid resolution. Downstream boundary conditions are informed by the Humber Extreme Water Levels (HEWL) modelling (Jacobs, 2021). Breach modelling was undertaken as part of this project. The closest breach to the Site is 03_Keadby north. Please note, the H++ scenario for sea level rise was not simulated as part of this modelling so this would need to be undertaken to inform the Flood Risk Assessment. The HEWL (Jacobs, 2021) modelling did consider a H++ scenario, and in theory this could be used to update the downstream boundary conditions for the Tidal Trent (Jacobs, 2023) model, so that the H++ scenario can be run. In terms of the North and South Soak Drains and Three Rivers, this was modelled in 2017 by Capita AECOM. For the most part, the proposed site is outside of the defended modelled flood extents from the Capital AECOM (2017) modelling of the North and South Soak Drains and Three Rivers. It is however important to note	

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		that this modelling uses older UKCP09 climate change uplift estimates. We do not hold any detailed hydraulic modelling data for the Keadby Boundary Drain or Eastoft Moors Drain. The highest flood levels at the proposed site location are driven by the Tidal Trent, particularly in a scenario where the Trent embankments breach. Whilst any proposed development platform is likely to be well above any flood levels for the Keadby Boundary Drain, Eastoft Moors Drain, Three Rivers, and North and South Soak Drains, it is important to demonstrate that the proposed development will not have an adverse effect on flood risk for these watercourses. When using Environment Agency modelling for Flood Risk Assessments, please check that the modelling is suitable for your needs, in line with guidance on using modelling for Flood Risk Assessments, which is available online here: Using modelling for flood risk assessments - GOV.UK (www.gov.uk)	

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		Hydraulic modelling information for the Tidal Trent, Three Rivers, and North and South Soak Drains can be requested via dnlenquiries@environment-agency.gov.uk	
		Geomorphology The following comments should be used as guiding principles to consider, when designing water crossings, to avoid negatively impacting the geomorphology and interference of natural processes. Ensure watercourse crossing design is informed by assessment of fluvial processes and geomorphology. For example, depth of HDD crossing should consider the likelihood of vertical channel change. Any decommissioning works should ensure that there are no alterations to the geomorphology of the river. For example, infrastructure such as access tunnels, which are left in-situ after decommissioning, could be exposed by future	The comments are noted and are considered in the design and mitigation measures.

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		river movement, becoming an impediment to natural processes. We further advise to utilise opportunities to deliver WFD mitigation measures as part of the design. Design should ensure mitigation measures can be delivered. For example, cables should not be brought to surface level in floodplains earmarked for future river restoration.	
		Water Quality We understand that the current design stage of the project does not allow detailed information on the likely impacts of the development to be presented. However, we would like to share the following aspects, which were not detailed, but we believe should be incorporated into the assessment on water quality impacts within the Preliminary Environmental Impact Report (PEIR): • Impacts from construction run-off and/or any construction related trade discharges. Mitigation	The **Outline CEMP** (**Application Document Ref. 7.4)** includes mitigation measures relevant to the water environment and flood risk. Relevant abstraction licences and environmental permits for discharges will be obtained. Engagement on consents will commence with stakeholders once the designs and details are finalised. Refer to paragraphs 12.3.21, 12.3.22 and 12.3.23 in relation to existing consents.

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		for these impacts is typically included within a CEMP. We note that the water environment is currently not included in the list of the contents of the CEMP provided in Section 3.6. • The impact of sewage discharges, during construction and operation, and how they will be mitigated. This could include the installation of a new sewage treatment plant or disposal to foul sewer. If the latter is the case, we would wish to see assurances from Severn Trent Water that the development will not cause significant impacts elsewhere within the sewer network. • Discharges from the water treatment plant and package treatment plant described in section 3.3. • Discharges of site drainage during operation, including potential risks from substances being stored onsite and fire water. It is likely that some, or all, of the activities listed above will require an environmental permit. Environmental permits are a key piece of mitigation, and it would therefore be positive to	The baseline has been amended in line with comments.

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		have a clear description of activities that require a permit within the PEIR. Applications for environmental permits can pose a significant risk to projects of this nature, due to the timeframes to determination and the possibility that applications are not duly made. To minimise these risks, we would like to encourage the applicant to engage with our permitting pre-application advice service at the earliest opportunity. They will be able to help ensure quality applications are submitted correctly in the first instance. They can also advise on the assessment methodology required for any of the potential discharges from the site. We would like to flag a few key details we feel were missed in the surface water bodies baseline conditions in Section 6.5.1.2. The North Soak Drain Catchment and the Torne/Three Rivers from Mother Drain to Trent Catchment, are also unable to meet Good ecological status because phosphate has been categorised as Moderate. The Southwestern most aspects of	

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		the site are within the Hatfield Waste Drain catchment.	
		Water Resources The water requirements of the proposal have not yet been defined explicitly at this stage. However, we are pleased to see that operational water requirements (cooling) have been considered, along with alternative options, and welcome the early pre-application engagement undertaken with the Canal & Rivers Trust and the Environment Agency to date. The decommissioning phase, and its impacts on water resources, needs to be scoped in. We will need to understand the water resources required for decommissioning works, and request that details are included in the water resource strategy. The source of supply for the Stainforth and Keadby canal (Sheffield and South Yorkshire navigation) is the River Don. Any changes to the use of existing abstraction licenses, increased	Table 12.3 highlights a number of water supply/ abstraction and effluent/ discharge streams anticipated during the works.

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		uptake, or applications for new abstraction, will need to consider the relationship between increased supply to the canal to maintain flow, or levels required for navigation, fish passage or freshening flows, and consider the potential for effective mitigations for these. We would like to see these impacts and risks scoped in, and covered in the water resources sections of the Environmental statement. We would also like to see more details of proposed uses of water and potential sources of supply, which the scoping report does not include. With the exception of potable/domestic use from public water supply identified in the project description, there are no consumptive uses of water identified in the scoping report for the construction and decommissioning phases of the proposal. We are aware that licenses currently exist which Keadby power station owns or operates, providing access to water for operational purposes which include process water, boiler feed and cooling. Projects of this	

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		size and scale have a significant water demand in the construction phase of the development. We would like to see the scoping include water requirements, which may also include dust suppression, machine washing, materials production (e.g. concrete) or any other consumptive uses of water. The scoping report does not include details of dewatering required for construction. If dewatering is required, the impact to groundwater resources, dependent surface water features and other lawful users, will need to be evaluated and it will require an abstraction licence if it doesn't meet the criteria for exemption in *The Water Abstraction and Impounding (Exemptions) Regulations 2017 Section 5: Small scale dewatering in the course of building or engineering works.* It may also require a discharge permit if it falls outside of our *regulatory position statement for de-watering discharges*. Consumptive abstraction from Groundwater may not be available, more details can be found in	

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		the Abstraction Licensing Strategy for the catchment. If the dewatering activity can be demonstrated to be discharged to the same source of supply without intervening use (i.e. non-consumptive), this will increase the likelihood of a licence being granted.	
Isle of Axholme and North Nottinghamshire Water Level Management Board	June 2024 Scoping Opinion	The Board's consent is required to erect any building or structure (including walls and fences), whether temporary or permanent, or plant any tree, shrub, willow or other similar growth within 9 metres of the top edge of any Board maintained watercourse or the edge of any Board maintained culvert. The Board's consent is required for any works, whether temporary or permanent, in, over or under, any Board maintained watercourse or culvert. The Board will require any cable crossings to be provided by means of HDD (or other trenchless methods) at a depth no less than 2 metres PLUS the cable safety distance below the hard bed level.	The Applicant will engage with the Board to agree design details and obtain relevant consents as required prior to construction.

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		The erection or alteration of any mill dam, weir or other like obstruction to the flow, or erection or alteration of any culvert, whether temporary or permanent, within the channel of a riparian watercourse will require the Board's prior written consent. The Board's Planning and Byelaw Policy, Advice Notes and Application form is available on the website - [redacted] The Board's consent is required for any works that increase the flow or volume of water to any watercourse or culvert within the Board's district (other than directly to a main river for which the consent of the Environment Agency will be required). The Board's consent is required irrespective of any permission gained under the Town and Country Planning Act 1990. The Board's consent will only be granted where proposals are not detrimental to the flow or stability of the watercourse/ culvert or the Board's machinery access to the watercourse/culvert which is required for annual maintenance, periodic	

Consultee or organisation approached	Date and nature of consultation	Summary of consultee response	How comments have been addressed in this chapter
		improvement and emergency works. It is not anticipated that the disapplication of powers will be needed or appropriate in the case of this development and as such the Boards consent will be required where appropriate.	

Baseline Data Collection

Desk based sources

12.3.3. The following sources of information that define the Proposed Development have been reviewed and form the basis of this assessment:

- **ES Volume I Chapter 4:** The Proposed Development (**Application Document Ref. 6.2**);
- **ES Volume I Chapter 5**: Construction and Management (**Application Document Ref. 6.2**) ;
- **ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)** including the Outline Drainage Strategy in Annex 3;
- **ES Volume II Appendix 12B**: WER/WFD Assessment **(Application Document Ref. 6.3)** including Annex 3 - Water Quality Data; and
- **ES Volume III Appendix 12C**: Navigational Risk Assessment (**Application Document Ref. 6.3**).

12.3.4. Figures presented in **ES Volume III (Application Document Ref. 6.4)** that define the Proposed Development and that have been reviewed include:

- **Figure 1.1**: Site Location Plan;
- **Figure 3.1:** The Draft Order Limits;
- **Figure 3.3:** Indicative Parts of the Site Plan
- **Figure 4.1:** Indicative Layout;
- **Figure 5.1**: Construction Laydown Areas.

Study Area

12.3.5. For the purposes of the water environment assessment, a study area of approximately 1km from the Site has been considered in order to identify surface and groundwater receptors that could reasonably be affected by the Proposed Development. However, since water flows and water quality impacts may propagate downstream, where relevant the assessment also considers a wider study area based on professional judgement. Professional judgement has been applied to identify the extent to which such features are considered. In this instance, the Proposed Development lies adjacent to the tidal River Trent. Given the size and length of the River Trent, it is unlikely that any further waterbodies downstream would be affected and thus the

River Trent is considered the final receiving waterbody that could conceivably be affected.

12.3.6. As flood risk impact can also influence waterbodies upstream and downstream, the Flood Risk Assessment (**ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3))** considers a wider study area, where relevant. Professional judgement has been applied to identify the extent to which such features are considered. Additional indirect effects may also occur to other water environment receptors distant from the study area through increased demand on water supplies and/ or foul water treatment.

12.3.7. The study area for the air quality assessment which has been used to inform the WER/WFD Assessment **(ES Volume II Appendix 12B (Application Document Ref. 6.3)**) covers a wider area including the ponds at Crowle Borrow Pits Site of Special Scientific Interest (SSSI) and Hatfield Chase Ditch SSSI. This is reported in **ES Volume I Chapter 8:** Air Quality **(Application Document Ref. 6.2)**.

Desk Study

12.3.8. Desk based research has been undertaken to identify the waterbodies within and adjacent to the Site, and to gather and critically evaluate relevant data and information on their condition and attributes.

12.3.9. In summary, the key background reports, websites and data used include the following:

- British Geological Survey's Geological Mapping Viewer, 'Geoindex' (BGS, 2025);
- Centre for Ecology and Hydrology (CEH)'s National River Flow Archive (CEH, 2025);
- Cranfield Environment Centre's 'Soilscapes' (Cranfield University, 2025)
- DEFRA's Multi-Agency Geographic Information for the Countryside (MAGIC) website (DEFRA, 2025);
- Environment Agency's Catchment Data Explorer (Environment Agency, 2025);
- Environment Agency's Water Quality Archive (Environment Agency, 2025);
- Environment Agency's Flood Risk Maps (Environment Agency, 2025);
- Meteorological Office's Climate averages data (Met Office, 2020);

- Ordnance Survey (OS) maps and aerial photography (Bing, 2025);
- Data requested from the Environment Agency with regard to water quality of receptors in the study area, water resources (licensed abstractions), pollution incidents, fisheries and aquatic ecology data and WER/WFD information and data;
- Information available through previous applications for Marine Consent associated with the operation and maintenance of the Keadby 1 Power Station intake and outfall;
- Information available in previous Section 36 Consent (including associated Environmental Statement (ERM, 2016) and planning applications relating to Keadby 2 Power Station; and
- Information available from the previous Keadby CCS Power Station DCO.

Site Surveys

12.3.10. The Preliminary Ecological Appraisal (**ES Volume II Appendix 11C**: (Annex 4) (**Application Document Ref. 6.3**) has been informed by previous habitat and protected species surveys undertaken on behalf of the Applicant between 2017 and 2023, with additional survey work in 2024 to re-verify and update the previous survey findings for the Proposed Development.

12.3.11. These surveys have been reviewed in tandem with results from a site walkover that was undertaken for the Keadby Carbon Capture scheme on 31 July 2020 by surface water quality specialists in warm, dry and sunny conditions following a week of dry weather. The walkover focused on surface waterbodies in the study area, observing their character and condition, the presence of existing risks and any potential pathways for construction and operational impacts.

Source-Pathway-Receptor Approach

12.3.12. The impact assessment is based on a source-pathway-receptor approach. For an impact on the water environment to exist the following is required:

- an impact source (such as the release of polluting chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or the loss or damage to all or part of a waterbody);
- a receptor that is sensitive to that impact (i.e. waterbodies and the services they support); and
- a pathway or pathways by which the two are linked.

12.3.13. The first stage in applying the source-pathway-receptor model is to identify the potential causes or 'sources' of impact from a development. The sources have been identified through a review of the details of the Proposed Development, including the size and nature of the development, potential construction methodologies and timescales. The next step in the model is to undertake a review of the potential receptors, that is, the water environment receptors that have the potential to be affected. Waterbodies including their attributes have been identified through desk study and historic site surveys. The last stage of the model is to determine if there is a viable exposure pathway or a 'mechanism' linking the source to the receptor. This has been undertaken in the context of local conditions relative to the water receptors within the study area, such as topography, geology, climatic conditions and the nature of the impact (e.g. the mobility of a liquid pollutant or the proximity to works that may physically impact a waterbody).

12.3.14. The assessment of the likely significant effects is qualitative, and considers construction, operational and decommissioning phases, as well as cumulative effects with other developments. This assessment has considered the risk of pollution to surface waterbodies directly and indirectly from construction activities, particularly in relation to those water features which are within or close to the Site. The risk of pollution from urban runoff and the increased demand on water resources has also been considered so that appropriate measures (e.g. SuDS, proprietary treatment devices, and water conservation measures) can be incorporated into the design of the Proposed Development.

12.3.15. Some specific assessments have been (or will be) undertaken to support this impact assessment process. These are described in more detail in the following sections.

Water Environment Regulations/Water Framework Directive Assessment

12.3.16. New developments that have the potential to impact the current or targeted status of a water body are required to assess their compliance against the WER objective of the potentially affected waterbodies. In accordance with the Planning Inspectorate's (PINS) Advice Note Eighteen and the Environment Agency guidance for completing WER assessments for coastal and transitional water, a three-stage approach may be adopted:

- Stage 1: WER Screening (Baseline);
- Stage 2: WER Scoping (Preliminary); and

- Stage 3: WER Impact Assessment.

12.3.17. A WER/WFD assessment has been undertaken to present the findings of Stages 1-2 (Screening and Scoping) in **ES Volume II Appendix 12B** (**Application Document Ref. 6.3**).

Flood Risk Assessment

12.3.18. A FRA is provided in **ES Volume II Appendix 12A** (**Application Document Ref. 6.3**) which assesses the current and future risk of flooding from all sources including tidal, fluvial, surface water, groundwater and artificial sources. The FRA includes a full description of the flood risk baseline, which is also summarised in Section 12.5 of this chapter.

Water Resource Assessment (Water Management Strategy)

12.3.19. The Proposed Development will utilise and dispose of water during both the construction and operation phases, as summarised in Table 12.3, in agreement with the relevant stakeholders.

Table 12.3: Water Demand and Effluent Streams (Anticipated source/ destination)

	Construction	Operation
Water Demand (abstractions/supply)	Consumptive water for construction activities and facilities (Yorkshire Water mains supply for potable water. Other sources, such as rainwater harvesting, for non-potable water) Non-consumptive water from water management activities such as dewatering (groundwater/surface water)	Potable water for domestic and sanitary use, and fire water (Yorkshire Water mains supply) Cooling water/ process water and fire water (Canal abstraction)
Water effluent (discharges)	Clean drainage water (to IDB watercourse)	Clean surface water (to IDB watercourse)

	Construction	Operation
	Dewatering discharge (preferably returned to source) Trade effluent from construction activities (discharged to Trent, sewer or tankered dependent on effluent, potentially treated) Foul water from domestic and sanitary use (preference to sewer but could use package treatment plant discharged to Trent if sewer connection not available)	Treated effluent (treated and discharged to Trent) Foul water from domestic and sanitary use (preference to sewer but could use package treatment plant discharged to Trent if sewer connection not available)

12.3.20. All abstractions and discharges will be obtained in line with the relevant legislation and consenting requirements from the Canal Rivers Trust, Environment Agency, Internal Drainage Board, North Lincolnshire Council, Yorkshire Water and Severn Trent; including the relevant assessments of impacts on water resources and water quality.

12.3.21. The Schedule of Other Consents and Licences **(Application Document Ref. 5.4)** provides information on consents and licences that are, or may be, required under other legislation for the construction and operation of the Proposed Development, outside of the **Draft DCO (Application Document Ref. 3.1)**.

12.3.22. The EA approved a variation to the Canal and River Trust's licence to abstract water into the Stainforth and Keadby Canal from the River Don for the purposes of evaporative cooling, boiler feed, make-up or tup-up water and process water in April 2023 (Licence MD/028/0083/014) for the Keadby CCS Power Station Power Station project. The additional quantities of water were available for abstraction as a result of canal improvement works, without increasing abstraction from the River Don.

As the Proposed Development is an alternative to the Keadby CCS Power Station project, it is considered that the abstraction licence could be utilised for the Proposed Development. An application to vary the licence will be submitted, if required, to allow canal water to also be used for other purposes (such as fire water top-up) with no change to consented abstraction volumes (a normal variation).

12.3.23. An amended environmental permit (EPR/YP3133LLv013) has been granted for the Keadby CCS Power Station project for discharge of treated effluent. It is understood that should the Proposed Development progress, a new permit may be required, but it would be able to comply with the permitted discharge parameters for Keadby CCS Power Station (both quantity and quality).

12.3.24. The detailed drainage design will be finalised during the detailed design (post-DCO), and approved prior to construction. An Outline Drainage Strategy is outlined in Annex 3 of the FRA (**ES Volume II Appendix 12A**: Flood Risk Assessment **(Application Document Ref. 6.3)**.

12.3.25. The **Outline CEMP** (**Application Document Ref. 7.4)** outlines measures to be adopted by the contractor to improve water efficiency during construction, for both potable and non-potable end uses. The measures draw on best practice from other construction schemes.

Cooling Water System Abstraction and Discharge Assessment

12.3.26. The Proposed Development will require a source of cooling water for heat rejection purposes. A number of options are technically feasible to achieve the required cooling including options for direct/ hybrid cooling. Technical assessments have been undertaken to identify preferred cooling options for the Proposed Development with the Keadby Canal abstraction option taken forward; see 12.3.22. Engagement is ongoing with the Canal and River Trust in regards to the abstraction.

12.3.27. The Applicant is proposing to re-use existing assets and pipework for Keadby 1 Power Station for the discharge of treated effluent to the River Trent. A Water Discharge Corridor is included in the Site, comprising the existing easement of the existing cooling water corridor north-east from Keadby 1 Power Station connecting with the River Trent. Interconnecting pipework would extend from the Proposed Development to connect to this infrastructure. As noted in paragraph 12.3.23, a new permit may be required for the discharge of the treated effluent, but it would be able to comply with the parameters (quality and

quantity) of the discharge permit obtained for Keadby CCS Power Station .

Assessment of Surface Water Runoff for the Operational Phase

12.3.28. The increase in hard standing that is included in the proposal will increase the volume of surface water runoff from the site. This increased flow has the potential to cause an increased flood risk to both the site and surrounding areas. It is therefore necessary to manage this increased flow, preferentially by discharging to ground through infiltration (which has been discounted at the site due to the local hydrogeological conditions). It is also possible to discharge to surrounding watercourses and in exceptional circumstances, to sewers; however, the flow should be attenuated to allow peak flows and volumes to match pre-development levels.

12.3.29. During operation, this increased surface water runoff from the Proposed Development may contain pollutants derived from urban surfaces (e.g. inert particulates, litter, hydrocarbons, metals, nutrients and de-icing salts). This mixture of pollutants is collectively known as 'urban diffuse pollutants,' and although each pollutant may itself not be present in harmful concentrations, the combined effects over the long term can cause chronic adverse impacts. Changes in impermeable surfaced area within the Site may lead to increases in the rate and quantities of these pollutants from the Site to receiving watercourses, although it is noted that high risk areas would be bunded with water managed separately. An assessment is therefore needed to determine the potential risk to the receiving watercourses and to inform the development of suitable treatment measures.

12.3.30. The appropriateness of the surface water drainage measures in terms of providing adequate treatment of diffuse pollutants will be assessed with reference to the Simple Index Assessment method described in the SuDS Manual (CIRIA, 2015). The Simple Index Approach follows three steps:

- Step 1 – Determine suitable pollution hazard indices for the land use(s);
- Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index (for three key types of pollutants - total suspended solids, heavy metals and hydrocarbons). Only 50% efficiency should be applied to second, third etc. treatment train components; and
- Step 3 – If the discharge is to a waterbody protected for drinking water, consider a more precautionary approach.

12.3.31. The SuDS Manual only provides a limited number of land use types, so these will be chosen as the most suitable for the components of the Proposed Development. Where more than one pollution hazard category applies to a component of the Proposed Development, the worst pollution hazard will be selected. For areas where there is a greater risk of a chemical spillage, a process specific risk assessment may be required, for example, to inform the Environmental Permit application.

Classification of Effect and Significance Criteria for EIA Assessment

12.3.32. There is no standard guidance in place for the assessment of the likely significant effects on the water environment from developments of this type. Based on professional judgement and experience of other similar schemes, a qualitative assessment of the likely significant effects on surface water and groundwater receptors has been undertaken.

12.3.33. The classification and significance of effects has been determined using the principles of the guidance and the criteria set out in DMRB LA113 (Highways England, 2020) adapted to take account of hydromorphology. Although these assessment criteria were primarily developed for road infrastructure projects, they are suitable for any development project and provide a robust and well tested method for assessing the likely significance of effects. The methodology also considers advice set out in Department for Transport (DfT) TAG Unit A3, Environmental Impact Appraisal (DfT, 2024).

12.3.34. Approaches to mitigating potential significant effects during construction and operational phases have been described with reference to good practice guidance and design.

12.3.35. Following the DMRB LA 113 (Highways England, 2020) guidance, the importance of the receptor (Table 12.4) and the magnitude of impact (based on the criteria in Table 12.5 taking into account the likelihood of the impact occurring)[4] are determined and then used to determine the overall classification of effects (see Table 12.6). Where significant adverse effects are predicted, options for mitigation have been considered and proposed where reasonably practicable. The residual effects of the Proposed Development with identified mitigation in place have then been assessed.

[4] The likelihood of an impact occurring is based on a scale of certain, likely or unlikely. Likelihood has been considered in the case of water resources only, as likelihood is inherently included within the flood risk assessment

12.3.36. Whilst other disciplines may consider ‘receptor sensitivity’, ‘receptor importance’ is considered here. This is because when considering the water environment, the availability of dilution means that there can be a difference in the sensitivity and importance of a waterbody. For example, a small drainage ditch of low conservation value and biodiversity with limited other socio-economic attributes, is very sensitive to impacts, whereas an important regional scale watercourse, that may have conservation interest of international and national significance and support a wider range of important socio-economic uses, is less sensitive by virtue of its ability to assimilate discharges and physical effects. Irrespective of importance, all controlled waters in England are protected by law from being polluted.

Table 12.4: Evaluating the Importance for Surface Water, Groundwater and Flood Risk

Importance	Surface Water[1]	Morphology[2]	Groundwater	Flood Risk	Navigation
Very High	Watercourse having a WFD classification shown in a RBMP and Q95≥1.0m^3/s. European sites and sites protected/ designated under UK legislation (SAC, SPA, SSSI, Ramsar, salmonid water) / Species protected by relevant European Ecology and Nature Conservation legislation.	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river type.	Principal aquifer providing a regionally important resource and/or supporting a site protected under European or UK legislation. Groundwater locally supports GWDTE SPZ1	Essential infrastructure or highly vulnerable development Construction workers/Site Personnel and Public	Corridor is a navigation route of principal importance (high volume of domestic and commercial traffic, all year round, and close proximity to ports, marinas and moorings.
High	Watercourse having a WFD classification shown in a RBMP and Q95<1.0m^3/s. Species protected under relevant European or UK Ecology and Nature Conservation legislation.	Conforms closely to natural, unaltered state and would often exhibit well-developed and diverse geomorphic forms and processes characteristic of river type, with abundant bank side vegetation. Deviates from	Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater supports a GWDTE SPZ2	More vulnerable development	Corridor is a navigation route of high importance (high volume of domestic and commercial traffic, but not all year round and

Importance	Surface Water[1]	Morphology[2]	Groundwater	Flood Risk	Navigation
		natural conditions due to direct and/or indirect channel, floodplain, and/or catchment development pressures.			lower proximity to ports, marinas and moorings).
Medium	Watercourses not having a WFD classification shown in a RBMP and Q95 >0.001m^3/s.	Shows signs of previous alteration and / or minor flow regulation but still retains some natural features or may be recovering towards conditions indicative of the higher category.	Aquifer providing water for agricultural or industrial use with limited connection to surface water SPZ3	Less vulnerable development	Corridor is a navigation route of medium importance (e.g. intermittently used by a small number of domestic craft)
Low	Watercourses not having a WFD classification shown in a RBMP and Q95 <0.001m^3/s.	Substantially modified by past land use, previous engineering works or flow regulation and likely to possess an artificial cross-section (e.g. trapezoidal) and would probably be deficient in bedforms and bankside vegetation. Could be realigned or channelised with hard bank protection, or	Unproductive strata	Water compatible development	Corridor is rarely used for navigation or is non-navigable

Importance	Surface Water[1]	Morphology[2]	Groundwater	Flood Risk	Navigation
		culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and probable strategic need for maintenance dredging. Artificial and minor drains and ditches would fall into this category.			

Note 1: Professional judgement is applied when assigning an importance category to all water features.

All controlled waters are protected from pollution under the Environmental Permitting (England and Wales) Regulations 2016 and the Water Resources Act 1991 (as amended), and future WFD targets also need to be considered.

Note 2: Based on the waterbody 'Reach Conservation Status' presently being adopted for the High Speed 2 project (developed originally by Atkins) and developed from Environment Agency conservation status guidance (Environment Agency 1998a, 1998b) as DMRB guidance does not currently provide any importance criteria for morphology.

12.3.37. The magnitude of impact will be determined based on the criteria in Table 12.5 taking into account the likelihood of the impact occurring. The likelihood of an impact occurring is based on a scale of certain, likely or unlikely. Likelihood has been considered in the case of water resources only, as likelihood is inherently included within the flood risk assessment.

Table 12.5: Evaluating Magnitude for Surface Water, Groundwater and Flood Risk

Impact	Criteria	Description and Examples
Major Adverse	Results in a loss of attribute and/ or quality and integrity of the attribute	Loss or extensive change to a fishery. Loss of regionally important public water supply. Loss or extensive change to a designated Nature Conservation Site. Reduction in waterbody WFD classification. Increase in peak flood level (>100mm)[5]. Major disruptions to navigation or risks posed to navigable craft.
Moderate Adverse	Results in effect on integrity of attribute, or loss of part of attribute	Partial loss in productivity of a fishery. Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. Contribution to reduction in waterbody WFD classification. Increase in peak flood level (>50mm).

[5] All references to peak flood level in this table are for a 1% annual probability event for fluvial flooding and 0.5% annual probability event for tidal flooding, including climate change. Note: adapted from DMRB LA113 (Highways England, 2020).

Impact	Criteria	Description and Examples
		Delays to navigation as a result of a reduction in navigable channel extent.
Minor Adverse	Results in some measurable change in attribute's quality or vulnerability	Minor effects of water supplies. Increase in peak flood level (>10mm). Minor reductions to wetted width of the channel and at the edge of what is navigable.
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity	No risk identified to surface water or groundwater receptors. Negligible change in peak flood level (≤+/- 10mm).
Minor Beneficial	Results in some beneficial impact on attribute or a reduced risk of negative effect occurring	Contribution to minor improvement in water quality, but insufficient to raise WFD classification. Creation of flood storage and decrease in peak flood level (>10mm). Removal of an in channel structure at edge of or outwith of the navigable channel, which may lead to small improvements to travel times.
Moderate beneficial	Results in moderate improvement of attribute quality	Contribution to improvement in waterbody WFD classification. Creation of flood storage and decrease in peak flood level (>50mm). Removal of in channel structure increasing width of navigable channel leading to a reduction of travel times.

Impact	Criteria	Description and Examples
Major beneficial	Results in major improvement of attribute quality	Removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring to a watercourse. Improvement in waterbody WFD classiciation. Creation of flood storage and decrease in peak flood level (>100mm). Removal of an in channel structure leading to a significant reduction in collision risk to vessels.

Classification and Significance of Effect

12.3.38. Once the magnitude of impact and the receptor importance have been defined, the classification and significance of the potential effect can be derived by combining both assessments in a simple matrix as shown in **Table 12.6**. Effects classed as moderate or greater are considered significant in EIA terms (i.e. shaded cells). Where there is a range of effects (e.g. large/ very large) professional judgement has been used to determine the residual effect.

Table 12.6: Classification and Significance of Effect

Magnitude of Impact	Importance of Attribute			
	Very High	High	Medium	Low
Major	Very Large	Large / Very Large	Moderate / Large	Slight / Moderate
Moderate	Large / Very Large	Moderate / Large	Moderate	Slight
Minor	Moderate / Large	Slight / Moderate	Slight	Neutral / Slight

Magnitude of Impact	Importance of Attribute			
	Very High	High	Medium	Low
Negligible	Slight	Slight	Neutral / Slight	Neutral / Slight
No change	Neutral	Neutral	Neutral	Neutral

Note: adapted from DMRB LA104 (Highways England, 2020)

12.4. Use of the Rochdale Envelope

12.4.1. The assessment makes use of the 'Rochdale Envelope' approach under the Planning Act (2008) (HMSO, 2008). The approach is employed where the nature of the Proposed Development means that some details of the whole project have not been confirmed when the application is submitted, and flexibility is sought to address the uncertainty.

12.4.2. Key principles in the context of the DCO application process are given in the PINS Advice Note Nine: Using the Rochdale Envelope (PINS, 2018). This includes the need to outline timescales associated with the flexibility sought, and that the assessment should establish those parameters likely to result in the maximum adverse effect (the reasonable worst-case scenario) and be undertaken accordingly to determine significant effects from the Proposed Development and to allow for the identification of necessary mitigation.

12.4.3. The reasonable worst-case scenario assumptions (maximum parameters) and general assumptions for the purposes of the Water Environment assessment include:

- It is assumed that during construction the Contractor will as a minimum conform to all permit/consent/licence requirements and best practice measures to avoid, reduce and minimise the risk of water pollution or unacceptable physical impacts (without mitigation) on waterbodies. Details of this mitigation and best practice standards are described in Section 12.6 of this report and are to be secured via the final CEMP; an **Outline CEMP (Application Document Ref: 7.4)** is included with the application.

- The assessment considers an abstraction from the Stainforth and Keadby Canal, as described in **ES Volume I Chapter 4:** The Proposed Development (**Application Document Ref. 6.2**).
- For the Canal Water Abstraction, the following assumptions apply:
  - It is understood that the current abstraction license (MD/028/0083/014) was varied in 2022/2023 to include the abstraction required for the Keadby Next Generation project. It is assumed that no further variation to the license is required in relation to cooling water/process water for the proposed Keadby Next Generation abstraction[6].
  - It is assumed that a similar canal intake structure and layout as constructed for the Keadby 2 Power Station intake will be used for the Proposed Development. It is assumed that the overall dimensions of the new inlet will be no larger[7] than the Keadby 2 Power Station installation.
  - The maximum extent of the cofferdam working area would extend approximately 20m from the canal bank.
  - Water would be pumped out after any necessary fish rescue and at a suitable rate and way as to avoid any significant disturbance or scour of the canal bed.
  - No dredging would be required.
  - A pipeline would be constructed from the intake into the Proposed Main Site; as a worst case, it has been assumed that open-cut methods will be required for installation of any pipework across minor watercourses within the Proposed Main Site. Where this is required, it is assumed that flow would be temporarily over-pumped, diverted around or flumed through the working area and the watercourse fully reinstated on completion of works, in keeping with standard construction practice and taking into account relevant IDB byelaws.
  - All other pipework crossings in sensitive areas would use trenchless technologies, and at a sufficient depth below the bed to ensure that there is no risk of exposure.

[6] Although it is understood that no variation is required for cooling water/process water, the Applicant may consider applying for a variation to include additional uses (such as fire water or for construction non-potable demand).

[7] The existing Keadby 2 Power Station screen installation is designed for 442 litres per second (L/s) and the maximum estimated hybrid cooling water demand for the Proposed Development is approximately 348 L/s[7],

- At this stage in the design process, preliminary water supply and treated effluent discharge assessments have outlined what process waste waters may be generated by the Proposed Development. These assessments indicate that effluent contaminants may be generated from the following activities:
  - Cooling tower blowdown;
  - Boiler blowdown;
  - Process water effluents;
  - Waste from Selective Catalytic Reduction;
  - Surface water on process areas, that may be contaminated
  - Canal water treatment effluent (i.e. reject water treatment/retentate); and
  - Flue gas stack drain.
- It is proposed that treated effluent will be discharged via a dedicated pipeline connection to the existing infrastructure used by Keadby 1 Power Station to the River Trent. All discharges would be in accordance with an Environmental Permit required for the operation of the Proposed Development. It is assumed the discharge would be able to comply with the same quantity and quality requirements as the already consented Keadby CCS Power Station discharge.
- The assessment assumes that prior to discharge to the River Trent, effluent treatment facilities will be provided on site for treatment prior to discharge, to a rate compliant with the discharge limits set by the Environment Agency within the Environmental Permit.
- It is anticipated that the rate of discharge from the Proposed Development will be the same or less than the rate already consented for Keadby CCS Power Station and will be discharged intermittently, in combination with the 0.1 m^3/s permitted to be discharged from Keadby 2 Power Station and 15 m^3/s permitted to be discharge from Keadby 1 Power Station. Keadby 1 Power Station is likely to cease operation at some point during the operational life of Keadby Next Generation.
- The Environmental Permit will specify the release points and emission limit values required to maintain the status of the receiving waters. Cooling water will be monitored prior to discharge in compliance with the conditions of this permit. It is noted that the Keadby 2 and Keadby CCS Power Station Permit Variations specify that the emission limit values (and associated monitoring points) apply at the point of discharge within the Keadby 1 Power Station

cooling water culvert, not at the River Trent outfall point. The control points and parameters for the Proposed Development will be agreed by the Environment Agency.

- If required, a H1 screening assessment for discharges to water will be undertaken post-consent and will be finalised during the process of obtaining a new/varied Environmental Permit, once the licensor and their exact solvent composition is known; this will include an appraisal of the treated effluent against relevant Equivalent Quality Standard (EQS) values for the constituent parts of the treated effluent.
- For the purposes of this assessment it has been assumed that all foul water from welfare facilities will be directed via the existing foul water sewer to the Severn Trent Water pumping station on Chapel Lane, and from there to the nearest wastewater treatment works (WwTW), subject to suitability of the infrastructure and agreement with the local sewerage undertaker, Severn Trent Water. If the pipeline condition is not suitable for continued use, foul sewerage would instead be treated on site in a package treatment plant with the treated water directed to the River Trent via the water discharge connection (subject to an environmental permit).
- The preferred option is to discharge surface water drainage from the Proposed Development to Drain 1 (Glew Drain) which would be subject to agreement from the IDB. Alternatives are also being considered, in which case SuDS are likely to be provided in the form of ditches, swales and an attenuation pond.
- Runoff would be stored in an appropriately sized attenuation pond to accommodate the 1% Annual Exceedance Probability (AEP) event with 45% allowance for climate change.
- If required, Bypass oil water separators will be provided for surface water runoff to the attenuation retention pond situated upstream of the main outfall from the Site.
- the final drainage strategy, which will be secured by a requirement of the **Draft DCO (Application Document Ref. 3.1**), will incorporate pollution prevention measures as informed by the detailed drainage design which will include:
  - separation of process water from surface water drainage; and
  - use of bunds in areas where spillages are likely to occur.

- A primary objective of the site drainage system is to protect the local environment and waterbodies from accidental discharges of oil or other chemicals. The drainage design will allow for inclusion of isolation/ sluice valves in the drainage network to allow any unplanned chemical spills to be safely removed for treatment. Provision of a surface water drainage strategy, following consultation with the LLFA will be secured by requirement (Detailed Design) of the **Draft DCO** (**Application Document Ref. 3.1**).
- The expected treatment performance of different SuDS options will be based on advice reported in CIRIA C753 - The SuDS Manual (CIRIA, 2015a) using the Simple Index Approach. Professional judgement will be used when deciding the example land use used, and what treatment a particular option may provide, taking into account the design of the SuDS feature and whether it is considered to be 'optimum' or 'sub-optimum' for the Proposed Development.
- Any crossings of watercourses to facilitate either construction access (e.g. to temporary laydown areas) or permanent access, including emergency egress for the Proposed Development will seek to minimise the length of bank affected and impacts to these watercourses. Where upgrades to existing pipework are required, trenchless excavation methods ('sliplining') could be applied. This technique involves the existing pipeline remaining in-situ and acting as a host pipe for a new smaller diameter carrier pipe. The space between the two pipes ('annulus') would then be grouted and the ends sealed.
- The assessment has been based on understanding of flow pathways as observed during the site walkover and desktop study. Assumptions have been made regarding flow pathways for culverted sections of watercourses, based on Ordnance Survey mapping. Understanding of flow pathways is described for each watercourse in the baseline (Section 12.5).
- Assumptions relating to flood risk are outlined in **ES Volume II Appendix 12A** (**Application Document Ref. 6.3.16**) and relevant design and impact avoidance measures are described in Section 12.6.

12.5. Baseline Conditions

12.5.1. The relevant baseline physical characteristics of the study area and the water features present are described in this section and with reference to **ES Volume III Figure 12.1:** Surface Waterbodies and their Attributes (**Application Document Ref. 6.4**).

Land Use, Topography and Rainfall

12.5.2. The Site and a 1km study area surrounding this lies within the extensive floodplain of the River Trent within the Isle of Axholme. Land is generally low lying at elevations below 10m Above Ordnance Datum (AOD) and with very shallow gradients (with the exception being the former ash tip, up to 18m AOD, to the south-west of the Main Site). Beyond the area associated with the current (operational) Keadby 1 Power Station, land use is almost entirely arable farming, used mainly to grow wheat and sugar beets. The land is particularly fertile due to its history of annual flooding from the Trent and peat soil.

12.5.3. The Water Connection Corridors extend eastwards and north eastwards from the Site towards the village of Keadby, and the Site construction and operational access route extends to the south west, crossing numerous watercourses including Hatfield Waste Drain, the Sheffield and South Yorkshire Navigation – Stainforth and Keadby Canal (herein referred to as 'the Stainforth and Keadby Canal'), North Soak Drain and South Soak Drain.

12.5.4. In the vicinity of the Site, the River Trent is tidal (Humber Upper WER waterbody), therefore parts of the Site are within the UK marine area. No harbour works are proposed.

12.5.5. The study area has a complex surface water hydrology and a long history of land drainage. The Site and land north of the Stainforth and Keadby Canal is within the IoAaNNWLMB area indicated on **ES Volume III Figure 12.5:** Internal Drainage Board Assets (**Application Document Ref. 6.4**).

12.5.6. Based on the HadUK-Grid Gridded Climate Observations on a 1km grid over the UK, the site has an average rainfall of 618mm per year, with it raining more than 1mm on around 112 days per year. This is a relatively low level of rainfall when compared to the average for England (870mm per annum).

12.5.7. Plate 12.1 illustrates this data to show how the average rainfall varies throughout the year, with the wettest period being in the mid to late

summer to autumn, and driest in late winter to early spring. Average monthly rainfall is generally less than 60mm throughout the year. February and March are the driest months with an average of approximately 41mm between 1976 and 2023.

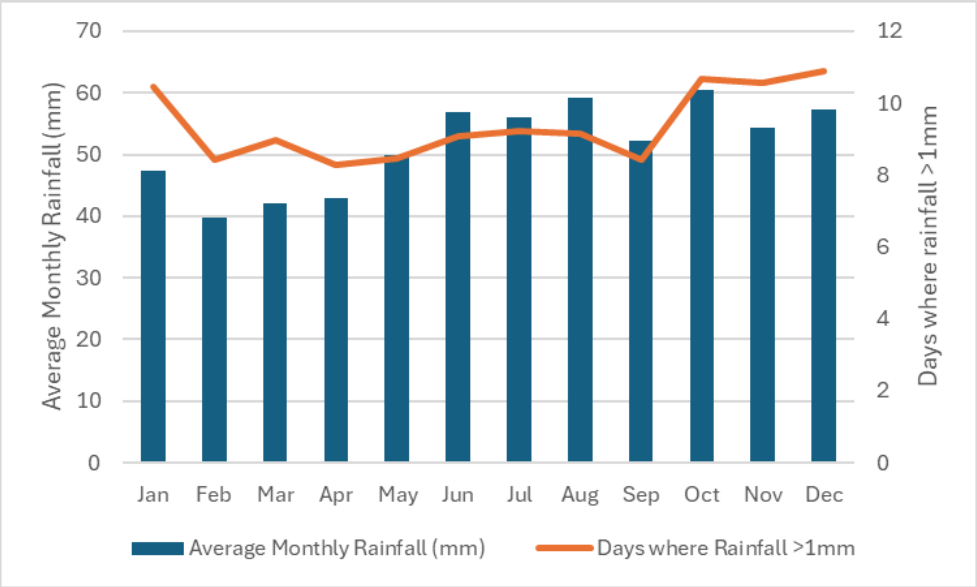

Plate 12.1 HadUK Gridded Climate Observations on a 1km grid for the KNGPS site - Average rainfall per month (1976-2023) and average days per month with >1mm of rainfall (1976-2023)

Groundwater, Geological Features and Soils

12.5.8. **ES Volume I Chapter 13:** Geology, Hydrogeology and Land Contamination (**Application Document Ref. 6.2**) describes the geology and groundwater at the Site, summarised here.

12.5.9. The British Geological Society (BGS) GeoIndex viewer (BGS, 2025) indicates that the entire study area is underlain by bedrock of the Mercia Mudstone Group. Above this, superficial deposits consist mainly of Warp (sand and silt) with Alluvium (clay, sand, silt, and gravel) along the course and immediate margins of the River Trent. Warp is artificially induced alluvium that was created when agricultural warping[8] was practiced.

12.5.10. According to the MAGIC online map (DEFRA, 2025) the bedrock beneath the Site is classed as a Secondary B aquifer ('predominantly

[8] Warping is the process of allowing turbid river water to flood agricultural land to deposit a layer of sediment to improve fertility before the water was allowed to drain away.

lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of former non-aquifers') whilst the superficial deposits across the Site are classed as a Secondary A aquifer ('permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers').

12.5.11. Historic ground investigation for the site indicates groundwater levels are relatively shallow (less than 2.0m bgl) within the Main Site.

12.5.12. According to the Environment Agency's online Catchment Data Explorer website (Environment Agency, 2025) the Proposed Development lies adjacent to the boundary between two operational groundwater catchments. To the north of the Stainforth and Keadby Canal is the 'Lower Trent Erewash – Secondary Combined' WER water body (GB40402G990300). This groundwater body has a surface area of approximately 1924km^2 and is currently at Good Overall Status. To the south of the Stainforth and Keadby Canal, the WER groundwater body is the 'Idle Torne - Secondary Mudrocks' (GB40402G992200). This waterbody has a surface area of approximately 321km^2 and is at Good overall status.

12.5.13. Information obtained from Cranfield Environment Centre Soilscapes website (CEC, 2024) describes the soils on the Site to be loamy and clayey soils of coastal flats with naturally high groundwater[9]. Land within this soil type is described as generally draining to local groundwater and mostly drained. Shallow groundwater and marginal ditches to most fields mean that the water resource is vulnerable to pollution from nutrients, pesticides and wastes that may be applied to the land.

12.5.14. According to the Enviro+Geo Insight report (Groundsure, 2024), Natural England reports the Agricultural Land Classification (ALC) to be Grade 2 for the majority of the Site. This is classed as soil of 'very good quality'. This land is further described as having only minor limitations which affect crop yield, cultivations or harvesting. It can support a wide range of agricultural and horticultural crops but there can be some reduced flexibility on land within the grade, which causes difficulty in the production of more demanding crops e.g. winter harvested vegetables and arable root crops. In areas of the Site south

[9] Soilscape identification description number 21

of the Stainforth and Keadby Canal, some parts are classified as Grade 1 (excellent quality). Further information is provided in **ES Volume I Chapter 3**: The Site and its Surroundings (**Application Document Ref. 6.2.3**).

Water Features

12.5.15. A Site walkover was undertaken on 31 July 2020 in sunny, dry conditions. Using observations taken on that visit, subsequent ecological site visits, data from OS mapping and the Environment Agency Catchment Data Explorer website (Environment Agency, 2025) the waterbodies listed in Table 12.7 were identified within the study area. **ES Volume III Figure 12.1:** Surface Waterbodies and their Attributes (**Application Document Ref. 6.4**) and **ES Volume III Figure 12.2:** Groundwater Waterbodies and their Attributes (**Application Document Ref. 6.4**) illustrates the location and WER status of these waterbodies.

Table 12.7: Summary of Waterbodies in the Study Area including WER status

Waterbody	Type of Waterbody	WER designation or associated WER Waterbody (where applicable)
River Trent	Transitional Waterbody (main river)	Humber Upper (GB530402609203)
Paupers Drain (includes Warping Drain and Eastoft Moors Drain)	Watercourse (ordinary) – maintained by IoAaNNWLMB	Paupers Drain Catchment (trib of Trent) (GB104028064300)
North Soak Drain (and South Soak Drain)	Watercourse (main river)	North Soak Drain Catchment (trib of Torne/Three Rivers) (GB104028064350)
Hatfield Waste Drain (includes North Engine Drain)	Watercourse (main river)	Hatfield Waste Drain Catchment (trib of Torne/Three Rivers) (GB104028064330)

Waterbody	Type of Waterbody	WER designation or associated WER Waterbody (where applicable)
Torne/Three Rivers (includes South Engine Drain and Folly Drain)	Watercourse (main river)	Torne/Three Rivers from Mother Drain to Trent (GB104028064340)
Sewer Drain	Watercourse (ordinary) - maintained by IoAaNNWLMB	Tributary of Humber Upper (GB530402609203)
Keadby Boundary Drain	Watercourse (ordinary) - maintained by IoAaNNWLMB	Tributary of Paupers Drain Catchment (trib of Trent) (GB104028064300)
South Moors Drain	Watercourse (ordinary) - maintained by IoAaNNWLMB	Tributary of Paupers Drain Catchment (trib of Trent) (GB104028064300)
North and South Cross Moors Road Drain	Watercourse (ordinary) - maintained by IoAaNNWLMB	Tributary of Paupers Drain Catchment (trib of Trent) (GB104028064300)
Sheffield and South Yorkshire Navigation – Stainforth and Keadby Canal	Watercourse (Canal)	Sheffield and South Yorkshire Navigation (New Junction and Stainforth and Keadby) (GB70410281)
Keadby Common Drain (Drain C as named in **ES Volume II Appendix 11C**: Preliminary Ecological Appraisal (**Application Document Ref. 6.3**))	Watercourse (ordinary) - maintained by IoAaNNWLMB	Paupers Drain Catchment (trib of Trent) (GB104028064300)

Waterbody	Type of Waterbody	WER designation or associated WER Waterbody (where applicable)
Kelsey Drain (Drain D8 as named in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**))	Watercourse (ordinary)	Paupers Drain Catchment (trib of Trent) (GB104028064300)
Pumping Drain	Watercourse (ordinary) - maintained by IoAaNNWLMB	Paupers Drain Catchment (trib of Trent) (GB104028064300)
Glew Drain (Drain 1 and Drain D as named in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**))	Watercourse (ordinary) - maintained by IoAaNNWLMB	Paupers Drain Catchment (trib of Trent) (GB104028064300)
Unnamed drainage ditches (including those named in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**))	Watercourse (ordinary) – generally maintained by private landowners	Tributaries of the various WFD waterbodies listed above
Five small ponds west of the River Trent (four immediately east of Keadby Boundary Drain, one south of Boskeydyke Farm)	Stillwater	Situated within the Paupers Drain Catchment (trib of Trent) (GB104028064300)

Waterbody	Type of Waterbody	WER designation or associated WER Waterbody (where applicable)
One small pond east of the River Trent within the study area, off Neap House Road	Stillwater	Situated within the Humber Upper (GB530402609203) catchment
Idle Torne – Secondary Mudrocks	Groundwater	WFD designation (GB40402G992200)
Lower Trent Erewash – Secondary Combined	Groundwater	WFD designation (GB40402G990300)

Surface Waterbodies

12.5.16. The Environment Agency's Catchment Data Explorer website (Environment Agency, 2025) confirms that the transitional waterbodies in the study area (i.e. River Trent) are contained within the:

- Humber River Basin District;
- Humber Transitional and Coastal (TraC) Management Catchment; and
- Humber Estuary TraC Operational Catchment.

12.5.17. The fluvial waterbodies are contained within:

- the Humber River Basin District;
- Trent Lower and Erewash, and Idle and Torne Management Catchments; and
- Trent and Trib, and Isle of Axholme Operational Catchments.

12.5.18. There are six WER designated surface water bodies within the study area, described briefly in Table 12.8. Although these are the WER reporting reaches, WER principles and objectives apply to all tributaries of these watercourses. The WER waterbodies include one transitional waterbody (Humber Upper transitional waterbody), four rivers (Paupers Drain Catchment (trib of Trent), North Soak Drain Catchment (trib of Torne/Three Rivers), Hatfield Waste Drain Catchment (trib of Torne/ Three Rivers) and Torne/ Three Rivers from Mother Drain to Trent) and

one canal (Sheffield and South Yorkshire Navigation (New Junction and Stainforth and Keadby)). **ES Volume III Figure 12.1:** Surface Waterbodies and their Attributes (**Application Document Ref. 6.4**) illustrates these waterbodies.

Table 12.8: WFD Surface Waterbodies in the Study Area

Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective	Hydromorphological Designation	Designated Reach
Humber Upper (GB530402609203) – Transitional Waterbody	Moderate	Does Not Require Assessment (Previously Fail)	Good (2027)	Heavily Modified	This section of the River Trent is designated from Owston Ferry to the south (approximately 13km upstream of Keadby) to its confluence with the River Ouse approximately 14.5km downstream of Keadby.

Previous Site Observations: The Humber Upper waterbody (River Trent) was observed during the site visit from the western bank adjacent to Keadby Power Station, where it flows from the south to the north. Embankments line the river here for flood protection. At this point the waterbody is tidal and has a width of approximately 140m. The river is used for navigation with a wharf at Keadby and the nearest jetty approximately 600m upstream on the east bank near Gunners Wharf. Further details regarding hydrodynamics, tides and sediments are provided later in the baseline.

Adjacent to Keadby village, there are two existing discharge points into the River Trent from Keadby Power Station (SE 83536 11647 and SE 83655 12226), with trash screens and bollards to prevent collision from passing boats. The tide was low enough during the site visit to expose intertidal muddy sediments at the channel margins.

The river adjacent to Keadby is situated in the Humber Estuary SSSI, Humber Estuary SAC and Humber Estuary Ramsar Site.

Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective	Hydromorphological Designation	Designated Reach
Paupers Drain Catchment (trib of Trent) (GB104028064300)	Moderate	Does Not Require Assessment (Previously Fail)	Good (2027)	Artificial	Unusually, this waterbody consists of two separate designated watercourses, Warping Drain and Paupers Drain which both flow west to east between Crowle and the River Trent, totalling approximately 13km length and draining an area of around 32.0km^2.
Previous Site Observations: Warping drain was observed from the B1392 at SE 83592 12125 where it crosses beneath the road. The watercourse is single thread and approximately 7m wide here and perfectly straight. There was no flow observed due to the tidal lock upstream of the River Trent. The watercourse was extremely turbid and so depth could not be ascertained. There was an algal bloom upstream of the tidal lock indicative of nutrient enrichment. The channel is incised with banks rising relatively steeply away from the channel bed. The banks and riparian zone was densely vegetated as would be expected in summer and provided a buffer strip to the arable fields beyond. The drain is a designated local wildlife site (LWS) as it supports a population of whorled water-milfoil (*Myriophyllum verticillatum*). The site is also designated for its wet reed beds with a large population of common reed (*Phragmites australis*).					
North Soak Drain Catchment (trib of	Moderate	Does Not Require Assessment	Moderate (2015)	Artificial	This artificial drain is designated between Thorne and Keadby, where it meets Torne/ Three Rivers shortly

Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective	Hydromorphological Designation	Designated Reach
Torne/Three Rivers) (GB104028064350)		(Previously Fail)			upstream of the River Trent. It is 26.4km in length and drains a catchment area of 55.6km^2
Previous Site Observations: North and South Soak Drains were observed during the site visit at SE 82505 11545 and SE 82487 11450, respectively. Both were approximately 8m wide and are straight, artificial drainage channels with steep banks, and are located either side of the Stainforth and Keadby Canal. Both were extremely turbid with phytoplankton such that depth could not be ascertained although is expected to be several metres. There were clumps of algae on the surface and they appeared nutrient enriched. Fine sediment accumulations were apparent at channel margins in some locations. South Soak Drain is located approximately 3m lower in elevation than the adjacent canal, and the drain supports rich aquatic, emergent and marginal flora. The drain is a designated LWS for its swamp habitat which is dominated by common reed.					
Hatfield Waste Drain Catchment (trib of Torne/Three Rivers) (GB104028064330)	Moderate	Does Not Require Assessment (Previously Fail)	Moderate (2027)	Artificial	The designated reach consists of two branches, one rising at Old Cantley and the other near Tunnel Pits Farm. The two arms meet near the A18 at Bolton Grange and flow east to meet the Torne/ Three Rivers at Pilfrey Bridge. The designated watercourse is

Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective	Hydromorphological Designation	Designated Reach
					36.4km in length and drains a catchment of 120.2km^2.
Previous Site Observations: This watercourse was not visited as part of the previous Water Environment walkover. **ES Volume II Appendix 11C**: Preliminary Ecological Appraisal Report (**Application Document Ref. 6.3**) indicates that this is a designated LWS for a rich aquatic, emergent and marginal flora with a surrounding mosaic of neutral grassland and common reed swamp.					
Torne/ Three Rivers from Mother Drain to Trent (GB104028064340)	Moderate	Does Not Require Assessment (Previously Fail)	Good (2027)	Artificial	This watercourse includes the River Torne, South Engine Drain and Folly Drain. In total, it is designated from the north-east of Rossington and flows generally north west to meet the River Trent at Keadby. In places the drains move apart and flow parallel to each other. Their combined total length is 50.6km, and they drain a catchment of 85.3km^2.
Previous Site Observations: Torne/ Three Rivers from Mother Drain to Trent was not visited during the previous Water Environment walkover due to being upstream of the Proposed Development, and so should not be impacted. Three Rivers is a					

Waterbody	Ecological Status / Potential	Chemical Status	Overall Target Objective	Hydromorphological Designation	Designated Reach
LWS designated for its three parallel canalised watercourses which support a rich aquatic, emergent and marginal flora. Similarly, the River Torne LWS is designated for supporting a rich aquatic, emergent and marginal flora. It is also designated for its surrounding neutral grassland, purple moor grass and rush pasture and marsh.					
Sheffield and South Yorkshire Navigation (New Junction and Stainforth and Keadby) (GB70410281)	Good	Does Not Require Assessment (Previously Fail)	Good (2015)	Artificial	The designated reach is 43.8km in length, extending from an offtake from the River Don in the centre of Doncaster to the south west, to the River Trent immediately south-east of the Keadby 1 Power Station.

Previous Site Observations: This watercourse was visited between the road crossing at SE 82494 11484 and the lock gates between the canal and River Trent at SE 83444 11423. The canal by its nature is artificial and so very straight. At this point it is a wide waterbody at approximately 30m width. There are four sets of lock gates separating the canal from the River Trent, managed by CRT. The canal appeared to be around 1.5m deep with the water being very clear at the time of the site visit. There was an abundance of submerged, floating and emergent macrophytes, and numerous fish were seen in the channel. The canal is used for navigation and water sports, and the towpath is popular for recreation. There is an existing abstraction point from the canal for Keadby 1 Power Station at SE 82997 11468, and the current Keadby 2 Power Station abstraction point was being constructed behind a cofferdam at the time of the previous site visit at SE 82769 11499.

The Stainforth and Keadby Corridor LWS is designated for a rich aquatic flora throughout its length. The canal is also designated for its mosaic of associated bankside habitats.

12.5.19. Within the catchments of the WFD waterbodies outlined in Table 12.8, there are also a number of named watercourses shown on Ordnance Survey mapping, and these are described in Table 12.9 based on the Site visit and walkover details also described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**).

Table 12.9: Other named watercourses in the study area that are not defined WFD waterbodies

Waterbody	Expected Tributary of	Watercourse Description	Previous Site Observations
Sewer Drain	River Trent	This drain flows as two connected parallel channels which are also parallel to the Warping Drain, approximately 30m and 330m to the north of Warping Drain between Keadby windfarm and the River Trent. Further upstream of the windfarm it is known as Old Sewer. Its approximate combined length is 3.5km.	This watercourse was not visited during the previous site visit as it is upstream of the Proposed Development and will not be impacted.
Keadby Boundary Drain	Warping Drain	This drain is orientated north south between North Pilfrey Farm to the south (adjacent to Stainforth and Keadby Canal) and north to Warping Drain. Its approximate length is 1.4km.	This watercourse was not visited during the previous site visit as it is upstream of the Proposed Development and will not be impacted.

Waterbody	Expected Tributary of	Watercourse Description	Previous Site Observations
South Moors Drain	Warping Drain	This drain is orientated north south between the Stainforth and Keadby Canal between Ealand Warpings and North Pilfrey Farm to the south, extending north to Bonnyhale Moor Road. It is approximately 1.1km in length.	This watercourse was not visited during the previous site visit as it is upstream of the Proposed Development and will not be impacted.
North and South Cross Moors Road Drain	Warping Drain	This drain is orientated north south between the Stainforth and Keadby Canal between Ealand Warpings to the south, extending north to Bonnyhale Moor Road. It is approximately 1.2km in length.	This watercourse was not visited during the previous site visit as it is upstream of the Proposed Development and will not be impacted.
Pumping Drain	Unnamed drainage ditch upstream of River Trent	This watercourse is orientated north south between Warping Drain and Chapel Lane, immediately north of Kelsey Drain. It is approximately 200m long.	Over-deepened watercourse with steep banks, which are bare earth in places. Artificially straight watercourse of approximately 2m width. The riparian zone to the west has several deciduous trees which provide a degree of shading.
Drain D1 (part of Glew Drain)	Unnamed drainage ditch	This drain flows along the northern	Field drain which is adjacent to, and part

Waterbody	Expected Tributary of	Watercourse Description	Previous Site Observations
as described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	upstream of River Trent	boundary of Keadby Common between Keadby Boundary Drain and Keadby 1 Power Station. It has a ninety degree change in course to the north-east of the substation and flows north to Warping Drain. It is approximately 1.7km in length.	of the wider designated Keadby Boundary Drain LWS. The drain is over-deepened and is subject to periodic dredging. The channel width is approximately 2m. Water depth is variable, but the average is around 30cm. The substrate within the drain is equal part clay to silt. Supports a moderately diverse flora.
Drain D2 as described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	Unnamed drainage ditch upstream of River Trent	This drain runs along the southern boundary to Keadby Common adjacent to the former laydown area for Keadby 2 Power Station. It is approximately 900m in length.	Field drain approximately 2m wide and 50cm deep. The channel was dominated by silt and the water surface was dominated by algae. Banks support modified grassland and dense scrub. Connected to other drains associated with Keadby Common.
Drain D3 as described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application**	Unnamed drainage ditch upstream of River Trent	This drain runs along the western boundary to Keadby Common.	Field drain approximately 1m wide with water depth approximately 20cm deep. The channel was dominated by silt. Banks support modified grassland and scrub.

Waterbody	Expected Tributary of	Watercourse Description	Previous Site Observations
Document Ref. 6.3)			Connected to the rest of the drains associated with Keadby Common.
Drain D4 as described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	Unnamed drainage ditch upstream of River Trent	This drain runs through the centre of Keadby Common and is approximately 380m long.	Field drain approximately 1m wide with water depth approximately 20cm deep. The channel was dominated by silt. Banks support modified grassland. Evidence of channel management through vegetation cutting evident during the PEA. Connected to the rest of the drains associated with Keadby Common.
Drain D5 as **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	Unnamed drainage ditch upstream of River Trent	This drain runs along the eastern boundary to Keadby Common adjacent to the existing 400kV National Grid substation.	Field drain with water depth in spring of approximately 10cm and 60cm wide. The channel was dominated by silt. Banks support modified grassland. Reed canary-grass was the only plant species observed within the channel, with cover approximately 90%. Connected to the rest of the drains associated with Keadby Common. Not surveyed in 2020, as only

Waterbody	Expected Tributary of	Watercourse Description	Previous Site Observations
			supports water in wetter months of the year (surveys undertaken in summer).
Drain D6 as described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	River Trent	This drain runs along the eastern side of the field south of Trent Road. It is therefore within the Site but distant from the land required for construction of the Proposed Development.	Field drain with water depth approximately 50cm and 2m wide. Banks supported rank semi improved grassland and a hedgerow. Common reed present.
Drain D7 as described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	Unnamed drainage ditch upstream of River Trent	This drain runs along the western side of the field south of Trent Road.	Shallow and largely overhung by the hedgerow. Water less than 10cm deep and likely dries up in drier months.
Drain D8 (also known as Kelsey Drain) as described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	Unnamed drainage ditch upstream of River Trent	This drain runs along a hedgerow north of Trent Road and then turns north towards Chapel Road	Shallow (10cm) ditch adjacent to a hedgerow. Limited vegetation.

Waterbody	Expected Tributary of	Watercourse Description	Previous Site Observations
Drains D10, D11, D12 and D13 as described in **A ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	South Soak Drain	Four connected arable field drains which are culverted under the existing road.	Linear field drains.
Drain A as described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	Unnamed drainage ditch upstream of River Trent	This drain is north of the Keadby 2 laydown area	The drain is approximately 2.0m deep, with water depths of approximately 20cm. Dry in 2020, but habitat changes as a consequence of Keadby 2 construction appear to have improved water supply to the drain. The drain is dominated by reeds along its length limited other aquatic plant species
Drain B as described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	Unnamed drainage ditch upstream of River Trent	This drain runs adjacent to Chapel Lane	Shallow (10cm deep) ditch, draining water from a SuDS pond. At the time of the PEA there was no aquatic vegetation present on the banks (showing evidence of having been recently cut).

Waterbody	Expected Tributary of	Watercourse Description	Previous Site Observations
Drain C (also known as Keadby Common Drain) as described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	Unnamed drainage ditch upstream of River Trent	This drain is orientated east-west between the residential properties to the north of Chapel Lane and Glew Drain. It is approximately 565m in length	The channel is 1.0m wide with water depth of approximately 0.4m. It has earth banks and is fringed with marginal reeds with a diverse submerged plant community. Bankside trees are absent.
Drain D (part of Glew Drain) as described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	Unnamed drainage ditch upstream of River Trent	Orientated north-south in the northeast corner of the proposed Main Site.	The channel is approximately 0.5m wide and was dry along the majority of its length, with it only supporting localised pooled water. It has earth banks, no bankside trees and support reeds throughout its length.
Drain D15 as described in **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**)	Unnamed drainage ditch upstream of River Trent	Located in broadleaved woodland adjacent to the proposed cooling water intake from the Stainforth and Keadby Canal	Channel width is approximately 1.0m, with a water depth of approximately 0.5m. The channel is heavily shaded from the surrounding woodland, with aquatic vegetation limited to Phragmites australis.

12.5.20. In addition to the watercourses described in Table 12.8 and Table 12.9, there are numerous small drains and ditches across the wider 1km study area. These are predominantly related to drainage of agricultural

land. In general, they are artificial, straight, embanked watercourses that may be nutrient enriched due to runoff of fertilisers and other farming products. They are generally expected to have minimal biodiversity value with many likely to be ephemeral (i.e. flowing for only part of the year or only after storms), with few geomorphic bedforms (e.g. riffles and pools).

12.5.21. There are five small ponds west of the River Trent in the study area. The largest is south of Boskeydke Farm (SE 83703 12940) and is approximately 2.0km^2. There are four immediately east of Keadby Boundary Drain, at SE 81311 12482, SE 81199 12003, SE 81373 11953 and SE 81275 12021. These are offline ponds, not obviously connected to other watercourses in the study area. There is also a small pond to the east of the River Trent at SE 84410 12362, but this is not considered further as it is upstream of the Proposed Development and on the opposite bank to the Proposed Development.

River Trent (Humber Upper waterbody) – Tidal Cycle

12.5.22. Preliminary assessments undertaken for the Proposed Development indicates that the estuary of the River Trent is characterised by a semi-diurnal tide (i.e. a cycle which has two high and two low tides a day). There is approximately 24 hours 50 minutes between two tidal crests (for example, high– low –high–low–high) and so one tidal cycle (that is, high–low–high) has a period of approximately 12 hours 25 minutes. In this regime, the two high tide levels are commonly unequal.

12.5.23. A complete tidal cycle from high tide to low tide to high tide comprises two distinct elements – the flood tide (the incoming tide when water levels are rising) and the ebb tide (the outgoing tide when water levels are falling).

12.5.24. There are two key variations in tides which occur over a 29-day cycle (i.e. spring and neap tides), with two spring and two neap tides occurring over this period. During neap tides, the tidal range is significantly reduced compared with that experienced during spring tides (that is, high tide levels are lower and low tide levels are higher). The maximum spring and neap tides occur approximately 1.5 days after new/ full Moon or first/ last quarter. These two variations have a significant influence on the range of impact on water quality and suspended sediment.

12.5.25. The tides experienced in the River Trent estuary have very pronounced spring and neap tides. In addition, the tidal cycle seen in the River Trent estuary is not perfectly symmetrical (i.e. flood and ebb portions of the cycle are of unequal lengths). This is due to frictional resistance

between oncoming and reflected tidal waves within the irregular coastline of the Humber estuary. In the River Trent, the time between ebb slack and flood slack is approximately three hours, while the difference between flood slack and ebb slack is approximately nine hours. This gives rise to a very rapid rise in tide level followed by a slow decline in the tide level. These times are subject to natural variation, particularly due to weather and flow within the River Trent itself.

12.5.26. Adjacent to the operational Keadby 1 Power Station, the typical mean tidal range is 4.7m (i.e. -0.4 mAOD to +4.3 mAOD) with a maximum astronomical tide range of 7.62m (i.e. - 0.81 mAOD to +5.81 mAOD).

12.5.27. The tidal limit of the River Trent is 70km upstream of the Proposed Development area at Cromwell Weir, shortly downstream of Newark-on-Trent.

River Trent (Humber Upper waterbody) - Hydrology

12.5.28. The area draining to the River Trent at Keadby comprises almost the whole of the Trent basin. The River Trent channel is entrained between primary flood defences at Keadby, with land on both sides of the river being very low-lying marsh at approximately 2m AOD. Over the last 170 years, the artificial component of total freshwater flows has increased due to the import of water for public supply from the Severn basin with subsequent discharge to the Trent catchment. At low flows, it is reported that the artificial component can make up half of the total flow (National Rivers Authority (now Environment Agency), 1994).

12.5.29. The long-term average mean daily flow from the Trent to the Humber Estuary was 7,590 megalitres per day (Ml/d) for the period 1969-92, mean summer flow (April-September) was 5,290Ml/d and mean winter flow was 9,910Ml/d. The flow which is exceeded for 95% of the time (Q95) was 2,340Ml/d for the same period (National Rivers Authority (now Environment Agency) 1994).

12.5.30. The daily maximum and minimum level data for the Keadby gauge at SE 08354 01131 have been obtained from the EA's hydrology data explorer website. The data for 1993-2024 is shown in Plate 12.2 (note that data past 2022 is unchecked and therefore shows erroneous data spikes).

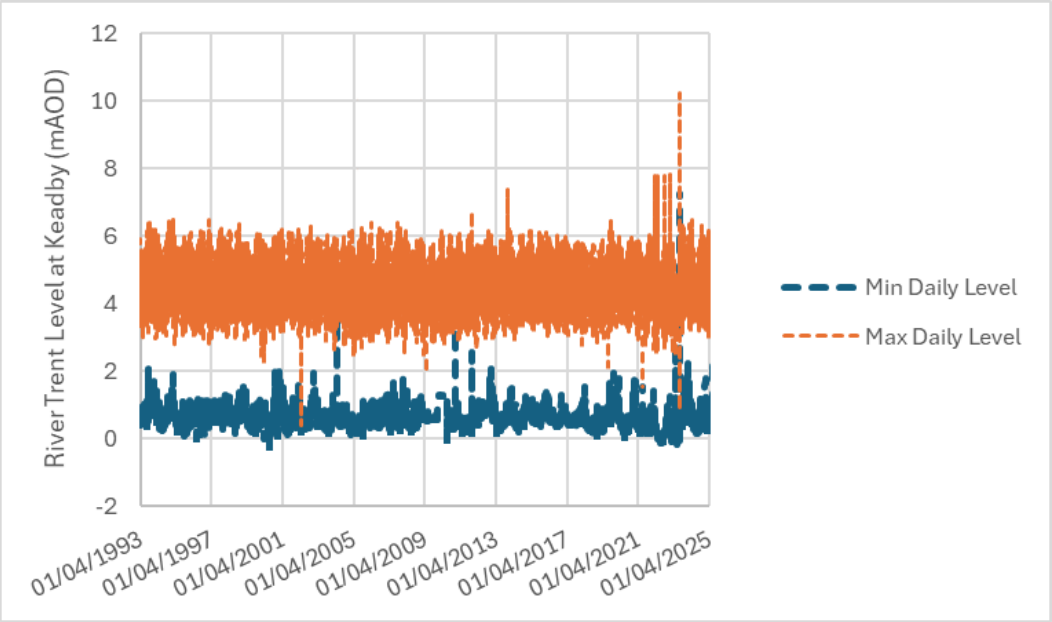

Plate 12.2 Daily Maximum and Minimum Levels (m AOD) for the River Trent at the Environment Agency's Keadby gauge.

River Trent (Humber Upper waterbody) – Sedimentology

12.5.31. A review of available sampling analysis for neighbouring Marine Licence applications (MLA), as advocated by the International Maritime Organisation (IMO) sampling guidelines (IMO, 2005), has been undertaken.

12.5.32. The sediment characteristics of The River Trent adjacent to the Site have been considered as part of preliminary water supply and effluent discharge feasibility assessments for the Proposed Development. Initial findings suggest that the suspended solid concentration and particle size distribution varies considerably from hour to hour, from season to season, and climatically as a result of tidal conditions, floodwater, degree of saline mixing, turbulence due to river traffic and dredging activities.

12.5.33. The results of particle size analysis undertaken at the Keadby 1 Power Station cooling water intake (John Brown Engineering Ltd, 1996) are shown in Table 12.10 below:

Table 12.10: River Trent Water Particle Size (<10µm)

Particle Size	Minimum Concentration (%)	Maximum Concentration (%)	Mean Concentration (%)
<10 µm	42	90	59

12.5.34. Analysis of the dredged material removed annually from between the Keadby 1 Power Station intake and outfall locations identified the dredged material as silty clay (i.e. 31.3 - 62.5 µm particle size) with a specific gravity of 2.7 (CEFAS, 2017a). Analysis of the dredged material was undertaken in 2017 for trace metals, organotins (tributyltin, dibutyltin) and polyaromatic hydrocarbons (PAH) (CEFAS, 2017b). Trace metal results show slightly elevated levels of determinands cadmium, chromium, nickel, lead and zinc. These determinands were found to be above Cefas Action Level 1[10] however, in the context of the River Trent, they are not unusual (noting that sample results were reported to be 'within the expected range for the River Trent and Humber Estuary and therefore are not a cause for concern' (Cefas/ MMO, 2017).

12.5.35. The results for organotins showed that the levels were below limits of detection. However, the PAH results did show elevated levels for a number of determinands above Cefas Action Level 1. Cefas and the MMO noted that whilst PAH levels above Action Level 1 required further investigation, it was noted that levels had dropped since previous sampling in 2014.

12.5.36. Limited sample analysis of the River Trent at a point approximately 3.8km upstream of the intake was carried out in 1996 and 1997. The results from the two sets of sample analysis identified that the mean particle size varied from between 10 µm - 50 µm, indicating the variability of particle size distribution and the large quantity of fines in the sediment bed and wash load.

[10] Cefas action levels are non-statutory, but provide a method used to help determine the suitability of material prior to disposal to sea. Whilst it is focused on informing a decision on licensing of disposal activities, Action Levels can also be used to help inform wider considerations of potential environmental (marine) risk. Generally, material at/ below Action Level 1 is suitable for disposal to sea; material at/ above Action Level 2 may not be suitable for disposal to sea without prior treatment.

Surface Water Quality

12.5.37. Ahead of the 2019 Cycle assessments, the Environment Agency changed the methodology for undertaking the Chemical Status assessment, which resulted in all surface water bodies in England now failing their Chemical Status. These failures generally relate to four groups of global uPBT (ubiquitous, persistent bioaccumulative toxic) pollutants, known as 'forever chemicals', as well as the new inclusion of Cypermethrin within the priority substances assessment. The uPBTs include Mercury, certain Polycyclic aromatic hydrocarbons (PAHs), polybrominated diphenyl ethers (PBEs – a group of brominated flame retardants) and Perfluorooctane sulfonate (PFOS), a group of per- and polyfluoroalkyl substances (PFAS), which are being assessed for the first time.

12.5.38. For all water bodies, the chemical status is assessed only once per RBMP cycle (i.e. in 2019), and as such is recorded as 'does not require assessment' in interim Cycle 3 2022 status classifications. See Annex C of **ES Volume II Appendix 12B:** WFD Assessment (**Application Document Ref. 6.3**) for further information.

River Trent (Humber Upper waterbody) Water Quality at Keadby

12.5.39. Preliminary water supply and wastewater discharge assessments have summarised water quality data collected close to the study area. This is detailed further in Annex 3 (Baseline Surface Water Quality Data) in **ES Volume II Appendix 12B:** WFD Assessment (**Application Document Ref. 6.3**) which summarises available data on water quality within and close to the study area. The data indicates that the River Trent at Keadby is circum-neutral with high electrical conductivity as would be expected for a transitional water. It is a very turbid river with an average total suspended particulate matter of >300mg/L based on values of 406mg/L, 1,875mg/L and 3,347mg/L during three sampling programmes for this determinand. Based on the data in Annex 3 (Baseline Surface Water Quality Data) in **ES Volume II Appendix 12B:** WFD Assessment (**Application Document Ref. 6.3**), dissolved oxygen (mg/L) falls within the WER Good classification based on 5th percentile and High classification based on the mean.

12.5.40. Sanitary pollutants including Biochemical Oxygen Demand (BOD) and ammonia are present at low concentrations, likely due to the significant dilution provided due to the scale of the River Trent. Nitrate concentrations are high (mean 35mg/L) likely reflecting the agricultural land use of the surrounding catchment, with use of fertilisers which run off to watercourses draining to the River Trent. Certain metals such as copper and zinc are elevated and may exceed EQS. Such metals may

be derived from road runoff to watercourses across the catchment, including the Stainforth and Keadby Canal, which is then directed towards the River Trent.

Sheffield and South Yorkshire Navigation (New Junction and Stainforth and Keadby Canal) – Water Quality

12.5.41. Preliminary water supply and wastewater discharge assessments undertaken reviewed water quality monitoring data for the Stainforth and Keadby Canal, collected by the Applicant and it's appointed contractor for the construction of Keadby 2 Power Station. This is presented in Annex 3 (Baseline Surface Water Quality Data) in **ES Volume II Appendix 12B:** WFD Assessment (**Application Document Ref. 6.3**

12.5.42. The data indicates that pH is weakly alkaline, and the watercourse has moderate electrical conductivity. Turbidity is low, reflecting conditions noted on the site visit where the water was very clear. Nitrate and orthophosphate concentrations are very high as would be expected given the surrounding agricultural land uses. Several metals are elevated (e.g. dissolved copper), which may be driven from runoff from the road and railway crossings noted above.

Keadby Warping Drain – Water Quality

12.5.43. Water quality data has been obtained from the Environment Agency's Water Quality Archive (Environment Agency, 2024) for Keadby Warping Drain. The twenty most recent samples were taken between 2013 and 2018 and data is summarised in Annex 3 (Baseline Surface Water Quality Data) in **ES Volume II Appendix 12B:** WFD Assessment (**Application Document Ref. 6.3)** which indicates slightly alkaline conditions, with an average pH of 7.9.

12.5.44. A 10th percentile dissolved oxygen saturation of 38.9% falls within Poor classification (<45%). Available data suggests that the waterbody is extremely vulnerable to large fluctuations of dissolved oxygen which may be the result of nutrient rich water with an abundance of macrophytes. Nitrate and orthophosphate values are somewhat elevated and indicate potential pressure from the surrounding agricultural land uses through use of fertilisers and other products which may runoff to the watercourse.

Keadby Pumping Station Drain – Water Quality

12.5.45. Water quality data has been obtained from the Environment Agency's Water Quality Archive (Environment Agency, 2024) for Keadby Pumping Station Drain. The twenty most recent samples, taken

between 2019 and 2021, are summarised in Annex (Baseline Surface Water Quality Data) in **ES Volume II Appendix 12B:** WFD Assessment (**Application Document Ref. 6.3).** The data indicates the Keadby Pumping Station Drain is very slightly alkaline in nature with an average pH of 7.8 and falls within the WFD High classification based on the 20 samples considered.

12.5.46. A 10th percentile dissolved oxygen saturation of 61.33% falls within Good classification, with available data suggesting that the waterbody is vulnerable to large fluctuations of dissolved oxygen and may be the result of nutrient rich water with an abundance of macrophytes.

12.5.47. Nitrate and orthophosphate values are somewhat elevated and potentially indicate pressure from surrounding agricultural land uses through use of fertilisers and other products which may runoff to the watercourse.

Environmental Designations

12.5.48. Details regarding environmental designations within the area are provided in **ES Volume I Chapter 11:** Biodiversity, Ecology and Nature Conservation (**Application Document Ref. 6.2**).

12.5.49. Designated sites relevant to the water environment are illustrated in **ES Volume III Figure 12.4:** Ecologically designated Sites Relevant to the Water Environment (**Application Document Ref. 6.4**).

Ecology Overview

12.5.50. Details regarding aquatic ecology within the study area are provided in **ES Volume I Chapter 11:** Biodiversity, Ecology and Nature Conservation (**Application Document Ref. 6.2**). The chapter is supported by **ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document Ref. 6.3**) including Annex 4: Descriptions of Relevant Watercourses and Assessment of their Suitability for Riparian Mammals, Fish and Aquatic Invertebrates and **ES Volume II Appendix 11F**: Aquatic Ecology Report (**Application Document Ref. 6.3**).

12.5.51. Together, these include details on:

- fish surveys;
- macroinvertebrate surveys;
- macrophyte surveys;
- sites of ecological importance;

- other ecologically designated sites;
- LWS within 1km of the Site; and
- other designations.

Water Resources

12.5.52. The Enviro+Geo Insight report (Groundsure, 2024) provides information on water activity permits (i.e. discharges), water abstractions and past pollution incidents, summarised below. Water availability information has been obtained from the most recent abstraction licensing strategies for the area.

Water Availability

12.5.53. Keady Power Station is on the boundary of two of the Environment Agency's Catchment Abstraction Management Strategy (CAMS) areas: the Lower Trent & Erewash (LT&E) CAMS; and the Idle & Torne (I&T) CAMS.

12.5.54. The LT&E CAMS covers 174km of the River Trent (and tributaries) from its confluence with the River Dove until its confluence with the River Humber at Trent Falls (this includes the section passing the Keadby Power Station).

12.5.55. The Stainforth and Keadby Canal traverses the Idle and Torne catchment but has no hydrological interaction with the Idle and Torne catchment. The canal is fed by the River Don (Don and Rother Abstraction Licensing Strategy) where water is available, but abstractions are considered on a case-by-case basis due to being discharge rich.

12.5.56. The Environment Agency has undertaken a water resource assessment of the two catchment areas. The approach is illustrated in the CAMS documents (Environment Agency, 2020). The assessment indicates that the Environment Agency considers the area around Keadby Power Station within the LT&E CAMS as having water available for licensing at all but the lowest flows (i.e. Q95) where it is 'Restricted for Licensing'. With regards to the I&T CAMS assessment, this has identified that there is no water available for abstraction at any flowrate in the vicinity of Keadby Power Station.

12.5.57. The Canal and River Trust's Code of Practice (CRT, 2024) states consent is required for any abstraction from Trust watercourses whether permanent or temporary, including agricultural irrigation. The granting of which is not to be assumed on obtaining Environment

Agency consent as the CRT will take into account additional parameters. The Trust's Works Engineer or Utilities Team member will consult the Environment Team and Water Engineer to assess whether CRT are prepared to allow the abstraction and determine conditions this may be subject to.

12.5.58. Abstractions from the canal taking greater than 20m³ per day of water will also be subject to an abstraction licence from the Environment Agency. Abstractions from the canal would be applied for, and usually held, by the CRT. Refer to 12.3.22 in relation to the canal abstraction for cooling water and process water that has been licenced through an abstraction variation in 2023.

Water Activity Permits

12.5.59. There are 11 active water permits (i.e. formerly discharge consents) within 500m of the Proposed Development. These are listed in Table 12.11 and shown in **ES Volume III Figure 12.1:** Surface Waterbodies and their Attributes (**Application Document Ref. 6.4**).

Table 12.11: Water Activity Permits within the Study Area

Licence	Distance	Issued Date	Discharge Type	Receiving Water
Groundsure Data:				
3/28/83/0806 (Keadby 400KV Substation)	Within boundary	22/01/1968	Sewage Discharges – Final/treated effluent – not water company	Underground Strata
EPRLB3392RP (Keadby Power Station)	Within boundary	17/05/2019	Trade Discharges – Site Drainage	North Soak Drain
EPRLB3392RP (Keadby Power Station)	15m East	17/05/2019	Trade Discharges – Site Drainage	North Soak Drain
T/83/45559/R (Althorpe STW)	120m East	04/04/2023	Sewage Discharges – Final/treated effluent – water company	River Trent & New Idle River

Licence	Distance	Issued Date	Discharge Type	Receiving Water
T/83/00749/S (Vazon Swing Bridge House)	150m East	04/07/1960	Sewage Discharges – Final/treated effluent – not water company	Stainforth/ Keadby Canal
T749 (Vazon Swing Bridge House)	150m East	12/10/1960	Sewage Discharges – Final/Treated Effluent – not water company	Keadby Canal
WQ/72/1350 (Keadby Sanitary Station)	174m East	23/08/1977	Sewage Discharges – Final/treated effluent – not water company	Underground strata
WQ/72/137 (Canal Side)	245m East	21/08/1975	Sewage Discharges – Final/treated effluent – not water company	Underground strata
T/84/45990/R (Gunness Sewage Treatment Works)	247m East	18/10/2023	Sewage Discharges – STW storm overflow/storm tank and final/treated effluent – water company	River Trent
T/83/21614/O (Woodcarr Avenue Storm Overflow)	348m East	22/06/1992	Sewage Discharges – Sewer Storm Overflow – Water company	Three Rivers
T/83/45559/R (Althorpe STW)	481m Southeast	04/04/2023	Sewage Discharges – STW Storm	River Trent and New Idle River

Licence	Distance	Issued Date	Discharge Type	Receiving Water
			Overflow/storm tank – water company	

12.5.60. The consented discharges are for a range of uses including combined sewer overflows (CSO) on the sewerage network, final/ treated sewage effluent discharges, and discharges from Keadby Power Station including runoff.

12.5.61. The main process/cooling water discharge to the Trent from Keadby Power Station is captured within the installation permit EPR/YP3133LL.

Abstractions

12.5.62. Data derived from the Enviro+Geo Insight report (Groundsure, 2024) indicates that there are 21 licensed water abstractions within the 1km study area surrounding the Site, which are presented in Table 12.12 and **ES Volume III Figure 12.1:** Surface Waterbodies and their Attributes (**Application Document Ref. 6.4**). It is noted that all these licensed abstractions are from surface water, with no active groundwater abstractions in the study area.

Table 12.12: Abstraction Licenses within the Study Area

Licence Holder	Abstraction Licence	Use	Abstraction Point	Distance
Groundsure Report and EA Data Request				
Canal and River Trust	03/28/83/0171	Boiler Feed	Stainforth and Keadby Canal (Keadby Power Station)	Within boundary
Canal and River Trust	MD/028/0083/014	Boiler Feed. Make-up or top up water. General use relating to secondary category (medium loss). Evaporative Cooling.	Stainforth and Keadby Canal (Keadby Power Station)	Within boundary

Licence Holder	Abstraction Licence	Use	Abstraction Point	Distance
Canal and River Trust	MD/028/0083/014	Make-up or top up water. General use relating to secondary category (medium loss). Evaporative Cooling. Boiler Feed.	Stainforth and Keadby Canal (Keadby Power Station)	Within Boundary
ER Woodhouse	MD/028/0084/002/R01	Spray Irrigation – Direct	Near Keadby – Warping Drain	Within Boundary
Keadby Generation Ltd	03/28/85/0007	Energy Production	River Trent (Keadby Power Station)	Adjacent to site
RJ & AE Godfrey	MD/028/0084/005	Spray Irrigation – Direct	Warping Drain at Keadby, North Lincs	61m East
Warterton Hall Farms	03/28/83/0257/1	Spray Irrigation – Direct	North Pilfrey Farm, Keadby – North Soak Drain	67m West
Maw	MD/028/0083/005	Spray Irrigation – Direct	Hatfield Waste Drain at Curlews Farm, Crowle	125m southwest
J J & D S Stubley Ltd	03/28/83/0193	Spray Irrigation – Direct	Parish of Belton – South Engine Drain	148m southwest
G R Bletcher and Son Ltd	03/28/83/0088	Spray Irrigation – Direct	Near Althorpe, Scunthorpe – River Torne	452m southwest
G R Bletcher and Son Ltd	03/28/83/0161	Spray Irrigation – Direct	North Moor, Belton – Folly Drain	571m southwest

Licence Holder	Abstraction Licence	Use	Abstraction Point	Distance
R Smith & Son	03/28/83/0245	Spray Irrigation – Direct	Keadby with Althorpe – Unnamed Drain E and B	649m southeast
M & J Agriculture	03/28/83/0246	Spray Irrigation – Direct	Keadby with Althorpe – Unnamed Drain A and B	649m southeast
R Smith & Son	03/28/83/0245	Spray Irrigation – Direct	Keadby with Althorpe – Unnamed Drain A and B	649m southeast
RJ & AE Godfrey	03/28/84/0020/1/R01	Spray Irrigation – Direct	Keadby Common, Keadby, Scunthorpe – Trib of Sewer Drain	679m northwest
Higgins Agriculture Ltd	03/28/84/0014/1/R01	Spray Irrigation – Direct	Eastoft – Crowle and Eastcroft Boundary Drain	680m northwest
Higgins Agriculture Ltd	03/28/84/0014/1/R01	Spray Irrigation – Direct	Eastcroft – Eastcroft Boundary Drain	682m northwest
R Smith & Son	03/28/83/0245	Spray Irrigation – Direct	Keadby with Althorpe – Unnamed Drain – C & D	843m southeast
Rockscape Contract Services Ltd	MD/028/0083/019	Spray Irrigation – Direct	Moody Drain at North Moor Farm	847m southwest
Higgins Agriculture Ltd	03/28/84/001	Spray Irrigation – Direct	Eastoft – Old Sewer Drain	867m north

Licence Holder	Abstraction Licence	Use	Abstraction Point	Distance
	4/1/R01			
Rockscape Contract Services Ltd	MD/028/0083/019	Spray Irrigation – Direct	North Moor Drain at North Moor Farm	874m southwest

12.5.63. There are three abstraction licences directly related to Keadby Power Station, with the remaining abstractions being for agricultural use (direct spray irrigation).

12.5.64. NLC confirmed in September 2024 that there are no records of any private water supplies in the study area.

Water Pollution Incidents

12.5.65. The Groundsure report confirms that there have been no category 1 or 2 pollution incidents in the last 10 years.

Flood Risk

12.5.66. **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**) provides information relating to existing flood risk in the study area from all sources.

12.5.67. The Environment Agency's 'Flood Risk Maps for Planning' (Environment Agency, 2025) identifies areas subject to fluvial/ tidal flood risk. The Flood Zone definitions for the flood zones used on the Flood Map for Planning, are defined in Table 12.13 below. These have been illustrated on Figure 12A.1: Fluvial and Tidal Flood Risk (within **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**)) and should be referred to throughout.

Table 12.13: Flood Zone Definitions

Flood Zone	Definition	Probability of Flooding
Flood Zone 1	Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)	Low
Flood Zone 2	Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding.	Medium
Flood Zone 3a	Land having a 1% or greater annual probability of river flooding; or land having a 0.5% or greater annual probability of sea flooding.	High
Flood Zone 3b (Functional Floodplain)	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: - Land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or - Land that is designed to flood (such as a flood attenuation scheme), even if it would only flood	Very High

Flood Zone	Definition	Probability of Flooding
	in more extreme events (such as 0.1% annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)	

Tidal Sources

12.5.68. The River Trent is considered tidal from the Humber Estuary to Cromwell Lock, with the normal tidal limit approximately 70km upstream of the Site at SK 80932 61242. The Environment Agency's 'Flood Risk Maps for Planning' (Environment Agency, 2025) identifies that the entire Proposed Development and surrounding environs (other than a small, slightly elevated area between Keadby Common in the east, Keadby Boundary Drain in the west, and the canal to the south, and around Crowle) are located within Flood Zone 3. Flood Zone 3 is land assessed as having a 1 in 200 or greater annual probability of flooding from the sea (>0.5% Annual Exceedance Probability or AEP). The River Trent is tidal adjacent to the site and tidal food risk (flooding from the sea) is the dominant source of flooding.

12.5.69. The North Lincolnshire Strategic Flood Risk Assessment (SFRA) (North Lincolnshire Council, 2022) defines the Site as in the Tidal Flood Zone 2/3a.

12.5.70. No part of the site is included in land designated as Zone 3b; land where water has to flow or be stored in times of flood. This is due to the Site benefitting from the existing Environment Agency maintained flood defences (embankments) along the River Trent.

Tidal Flood Defences

12.5.71. There are existing tidal flood defences located approximately adjacent along the banks of the River Trent, and specifically, within the Water

Connection Corridor for the Site. The Environment Agency Asset Management Dataset demonstrates that the tidal defences are 6.2m to 6.3m AOD and have been built to provide a 1 in 100-year level of protection. According to the additional information provided by the Environment Agency, the tidal defences protecting the area around the Site consist of concrete floodwalls and embankments, and are typically in 'fair' condition' - further details are provided in **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**). The Environment Agency inspect these defences routinely to ensure potential defects are identified. The residual risk of flooding in the event of a defence breach scenario has specifically been considered in relation to the Site and the preliminary findings presented in **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**).

Tidal Flooding – Summary

12.5.72. The majority of the Site is currently at a 'low' risk of flooding from tidal sources with the flood defences in place, except the Water Connections Corridor where shallow flooding may occur through defence overtopping. Over the lifetime of the development the risk is potentially more significant, precautionarily assuming an extended lifetime and no defence improvements to mitigate the effects of climate change.

12.5.73. If the defences were to fail and breach during the 0.5% AEP event, the hazard to the Site in its unmitigated state would be 'high' as flood waters would enter the area. However, the probability of a breach occurring is 'low' as it would require a high water level in the River Trent and a structural defence failure, meaning that the residual risk remains 'low'.

Fluvial Flooding

12.5.74. The Flood Risk Maps for Planning (Environment Agency, 2025) illustrates that the majority of the Site is located within Flood Zone 3 (high risk) defined as land having a >1% AEP (greater than a 1 in 100 chance in any year) of river flooding. Although it is noted the flood maps do not distinguish between tidal and fluvial flooding.

12.5.75. The EA's mapping shows the majority of the Site in an area at "Medium" risk of River and Sea flooding, assessed as between a 1% and 3.3% AEP. The proposed access south of the site passes through an area assessed at "High" risk of flooding (>3.3% AEP).

12.5.76. The SFRA mapping (NLC, 2022) shows the majority of the Site is located in SFRA Tidal Flood Zone 2/3a, with the access road from the

south passing through SFRA Fluvial Flood Zone 2/3a. These flood zones provide an estimate of the Flood Zone 3 extent including for the impact of climate change. The SFRA also mapped the functional floodplain (Flood Zone 3b). No part of the Site is included in land designated as functional floodplain.

12.5.77. Based on the information provided by the Environment Agency, it has been determined that the majority of the Proposed Development is at a 'low' risk of flooding from fluvial sources, with the exception of the southern access route and construction laydown area.

12.5.78. There is a residual risk associated with breach of the defences on the River Trent, however, as fluvial water levels are lower than tidal water levels the assessed tidal risk is the worst-case with regards to overtopping and breach on the Trent as previously described.

12.5.79. There is also a residual risk associated with failure of the pumped drainage systems in the area. This is addressed through consideration of the SFRA "Critical Flood Level" as discussed within **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**).

Groundwater Flood Risk

12.5.80. 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).

12.5.81. The SFRA (NLC, 2022) references groundwater flooding that occurred in the SFRA area following the major flood event in July 2007 when groundwater levels rose following heavy rain and ponded where the water could not drain effectively. However, the accompanying mapping of recorded flooding does not include the Site.

12.5.82. The areas around the Site are artificially drained by various land drains and pumping stations, which help to maintain the groundwater level. These are expected to remain operational through the lifetime of the Proposed Development, contributing to a low risk of groundwater emergence at the Site.

12.5.83. In addition, a significant proportion of the Site is covered in impermeable hardstanding surface, reducing natural infiltration potential as part of the Proposed Development. As a result, due to hardstanding ground intercepting groundwater and preventing it from

reaching the surface, the likelihood of localised groundwater reaching the surface and causing flooding is reduced.

12.5.84. Based on the information provided in **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**), the Site is considered to be at low risk of flooding from groundwater sources.

Overland Flow of Rainfall Runoff (Pluvial Flooding)

12.5.85. Overland flow results from rainfall that fails to infiltrate the surface and travels over the ground surface; this is exacerbated where the permeability of the ground is low due to the soil (e.g. clayey soils) and geology or urban development with more impermeable surfaces.

12.5.86. The Environment Agency 'Risk of Flooding from Surface Water' maps (Environment Agency, 2024) 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 Site is generally not at risk from surface water flooding, classifying the majority of the land to be at 'very low' risk of flooding from surface water. The Environment Agency define 'very low risk' as an area that has a less than a 1 in 1000 (0.1%) probability of flooding in any given year. Mapping shows that there are isolated areas at low and medium risk along existing roads and paths on the Site, and one small area of high risk along East Road within the existing (operational) Keadby 1 Power Station site.

12.5.87. Based on available data presented in **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**), the risk to the Site from overland flow of surface water is considered to be 'low'. Localised flooding may occur, but this is expected to be mitigated through implementation of an effective drainage strategy for the Proposed Development.

12.5.88. There is also a residual risk associated with failure of the pumped drainage systems in the area. This is addressed through consideration of the SFRA "Critical Flood Level" as discussed within **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**).

Artificial Waterbodies – Flood Risk

12.5.89. The Site is not considered at risk from reservoir flooding based on the EA's Flood Risk from Reservoirs map (Environment Agency, 2024).

12.5.90. The Stainforth and Keadby Canal is directly adjacent to the Site, but given the flat, shallow gradients and that it drains into the River Trent by a sluice, the risk of flooding is also considered likely to be low from this source. During consultation, CRT advised the canal is fed by the River Don and therefore risk of flooding may increase during periods of excess flows.

12.5.91. If any overtopping of the canal were to occur west of the railway, this would drain into the North and South Soak drains located at a lower elevation on either side of the canal and drain away. To the east it is possible that water may flow towards the Site although it is unlikely that flood depths would be significant compared with tidal flooding. The Canal and River Trust confirmed their opinion that flooding from the canal is unlikely to pose any significant risk to the Site.

12.5.92. The risk of flooding to the Site from all artificial waterbodies is therefore considered to be low. Should flooding occur other watercourses may intercept flows before reaching the Site. Flood volumes reaching the Site are unlikely to lead to significant flooding compared with tidal inundation, and hence mitigation against tidal risk will address any residual risk.

Future Baseline

Construction

12.5.93. The future baseline has been determined qualitatively by considering the likelihood of changes in the attributes that are considered when deciding the importance of waterbodies in the study area.

12.5.94. Generally, there is an improving trend in water quality and the environmental health of waterways in the UK since the commencement of significant investment in sewage treatment in the 1990s, the adoption of the WFD from 2003, and the application of ever more stringent planning policies.

12.5.95. It is reasonable to assume that improvements in the biological quality of the River Trent may occur over time due to the WFD, which requires all waterbodies to achieve 'good ecological status' by 2027 (which is defined with reference to quantifiable parameters relating to ecological, hydromorphological, physico-chemical and chemical condition) and to experience no deterioration in status. Good ecological status by 2027 is therefore to be assumed.

12.5.96. Where waterbodies are currently at this overall status, there must be no deterioration from this, and there are also objectives for individual

elements of the WFD classification that are to be achieved (e.g. biological quality elements, physico-chemical parameters). It is assumed that these objectives would be achieved.

12.5.97. There are additional significant challenges such as adapting to a changing climate (i.e. in general drier summers, wetter winters, and an increased frequency of significant storms are forecast for the UK) and the pressures of population/ economic growth that could have a retarding effect on the water environment if it is not managed carefully through the design of projects, mitigation, and the maintenance of those mitigating solutions. However, again it is difficult to forecast these changes with any certainty.

12.5.98. The assessment of the importance of waterbodies takes into account a large range of attributes and does not focus solely on water quality. This assessment takes into account other attributes such as scale, nature conservation designations, fish habitat type, the presence of protected species, social and economic uses. For some of these attributes, it is unlikely that they will change in the future (e.g. waterbody size, whether a river is likely to support cyprinid or salmonid fish populations, the presence of a designated nature conservation site or bathing water).

Operation

12.5.99. The same future baseline conditions expected during construction will apply to the operation phase (i.e. all WFD targets are met, improving water quality, no change in the presence and status of designated sites).

12.5.100. Future baseline conditions for flooding are outlined in **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**)

Importance of Receptors

12.5.101. The importance of the local water resource receptors within the study area is described in Table 12.14. Importance is based on the criteria outlined above in Table 12.4.

Table 12.14: Importance of Identified Receptors

Receptor	Importance Descriptions
River Trent (Humber Upper WFD waterbody)	The River Trent is considered a **Very High importance** receptor for **water quality** on the basis of its scale, being WFD designated and supporting and range of internationally, nationally and locally protected nature conservation sites (e.g. Humber Estuary SSSI, Humber Estuary SAC and Humber Estuary Ramsar). It is also important for the dilution and dispersion of treated/ untreated sewerage/ trade/ process wastewater, which at the same time influence water quality and present a risk of chemical spillages. The **morphology** is considered **Low importance** due to the heavily modified nature of the channel, particularly along the banks. The channel is considered **High importance** for **navigation**.
Paupers Drain Catchment (trib of Trent) WFD waterbody	Paupers Drain (including Warping Drain) is considered a **High importance** receptor for **water quality** on the basis of being WFD designated and an estimated Q95 flow rate of <1 m^3/s. It also supports locally protected nature conservation sites (LWS). The **morphology** of the waterbody is considered **Low importance** as an artificial, heavily modified waterbody, with flow controlled by a tidal lock.
North Soak Drain Catchment (trib of Torne/Three Rivers) WFD waterbody	North Soak Drain Catchment (including South Soak Drain) is considered a **High importance** receptor for **water quality** on the basis of being WFD designated and an estimated Q95 flow rate of <1 m^3/s. It also supports locally protected nature conservation sites (LWS). The **morphology** of the waterbody is considered **Low importance** as an artificial, heavily modified waterbody.
Hatfield Waste Drain Catchment (trib of	Hatfield Waste Drain is considered a **High importance** receptor for **water quality** on the basis of being WFD designated and an estimated

Receptor	Importance Descriptions
Torne/Three Rivers) WFD waterbody (including North Engine Drain)	Q95 flow rate of <1m^3/s. It also supports locally protected nature conservation sites (LWS). The **morphology** of the waterbody is considered **Low importance** as an artificial, heavily modified waterbody.
Torne/Three Rivers from Mother Drain to Trent WFD waterbody	Torne/Three Rivers is considered a **High importance** receptor for **water quality** on the basis of being WFD designated and an estimated Q95 flow rate of <1m^3/s. It also supports locally protected nature conservation sites (LWS). The **morphology** of the waterbody is considered **Low importance** as an artificial, heavily modified waterbody.
Sheffield and South Yorkshire Navigation (New Junction and Stainforth and Keadby) WFD waterbody	Sheffield and South Yorkshire Navigation is considered a **High importance** receptor for **water quality** on the basis of its scale, being WFD designated and supporting a locally protected nature conservation site. It is also important for water supply with current abstractions to Keadby 1 Power Station, and another under construction to Keadby 2 Power Station. The **morphology** is considered **Low importance** due to being an artificial channel. The watercourse is considered **High importance** for **navigation**.
Sewer Drain	Sewer Drain is considered a **Medium importance** receptor for **water quality** on the basis of not having a WFD classification but is estimated to have a Q95 >0.001m^3/s. It is likely to be suffering from nutrient enrichment given the surrounding agricultural land use. It is considered a **Low importance** receptor for **morphology** on the basis of being an artificial watercourse (i.e. straight ditch with steep banks) with deficiency of bedforms.

Receptor	Importance Descriptions
Keadby Boundary Drain	Keadby Boundary Drain is considered a **Medium importance** receptor for **water quality** on the basis of not having a WFD classification but is estimated to have a Q95 >0.001m^3/s. It is likely to be suffering from nutrient enrichment given the surrounding agricultural land use. It is considered a **Low importance** receptor for **morphology** on the basis of being an artificial watercourse (i.e. straight ditch with steep banks) with deficiency of bedforms.
South Moors Drain	South Moors Drain is considered a **Medium importance** receptor for **water quality** on the basis of not having a WFD classification but is estimated to have a Q95 >0.001m^3/s. It is likely to be suffering from nutrient enrichment given the surrounding agricultural land use. It is considered a **Low importance** receptor for **morphology** on the basis of being an artificial watercourse (i.e. straight ditch with steep banks) with deficiency of bedforms.
North and South Cross Moors Road Drain	North and South Cross Moors Road Drain is considered a **Medium importance** receptor for **water quality** on the basis of not having a WFD classification but is estimated to have a Q95 >0.001m^3/s. It is likely to be suffering from nutrient enrichment given the surrounding agricultural land use. It is considered a **Low importance** receptor for **morphology** on the basis of being an artificial watercourse (i.e. straight ditch with steep banks) with deficiency of bedforms.
Drain C (also known as Keadby Common Drain)	Keadby Common Drain is considered a **Medium importance** receptor for **water quality** on the basis of not having a WFD classification but is estimated to have a Q95 >0.001m^3/s. It is likely to be suffering from nutrient enrichment given the surrounding agricultural land use. It is considered a **Low importance** receptor for **morphology** on the basis of being an artificial

Receptor	Importance Descriptions
	watercourse (i.e. straight ditch with steep banks) with deficiency of bedforms.
Drain D8 (also known as Kelsey Drain)	Kelsey Drain is considered a **Low importance** receptor for **water quality** on the basis of not having a WFD classification and an estimated Q95 <0.001 m^3/s. It is likely to be suffering from nutrient enrichment given the surrounding agricultural land use. The drain is considered a **Low importance** receptors for **morphology** on the basis of being an artificial watercourse (i.e. straight ditch with steep banks) with deficiency of bedforms.
Pumping Drain	Pumping Drain is considered a **Medium importance** receptor for **water quality** on the basis of not having a WFD classification but is estimated to have a Q95 >0.001m^3/s. It is likely to be suffering from nutrient enrichment given the surrounding agricultural land use. It is considered a **Low importance** receptor for **morphology** on the basis of being an artificial watercourse (i.e. straight ditch with steep banks) with deficiency of bedforms.
Drain D1/ Drain D2 /Drain D6	Drain D1, Drain D2 and Drain D6 are considered **Medium importance** receptors for **water quality** on the basis of not having a WFD classification but being estimated to have a Q95 >0.001m^3/s. These drains are likely to be suffering from nutrient enrichment given the surrounding agricultural land use. These drains are considered **Low importance** receptors for **morphology** on the basis of being artificial watercourses (i.e. straight ditches with steep banks) with deficiency of bedforms.
Drain D3/ Drain D4/ Drain D5/ Drain D7/ Drains D10 to D13/ Drain A/ Drain B/	Drains are considered **Low importance** receptors for **water quality** on the basis of not having a WFD classification and an estimated Q95 <0.001 m^3/s. These drains are likely to be

Receptor	Importance Descriptions
Drain D and Drain D15	suffering from nutrient enrichment given the surrounding agricultural land use. The drains are considered **Low importance** receptors for **morphology** on the basis of being artificial watercourses (i.e. straight ditches with steep banks) with deficiency of bedforms.
Other unnamed drains	Other unnamed drains are small in scale and artificially straight and incised. They are not WFD designated and considered likely ephemeral, and so are considered **Low importance** receptors for **water quality**, and **Low importance** receptors for **morphology**.
Small Ponds near Boskeydyke Farm and Keadby Common	**Low importance** for **water quality and morphology** as they are not designated and have minimal social or economic use.
Mercia Mudstone Bedrock (Secondary B aquifer)	The bedrock is a Secondary B aquifer which may store and yield limited amounts of groundwater. The aquifer is considered to be of **Medium importance** for water quality and resource.
Warp and Alluvium Superficial Deposits (Secondary A aquifer)	The superficial deposits are a Secondary A aquifer which can support local water supplies, and may form an important source of base flow to rivers. The aquifer is considered to be of **High importance** for water quality and resource.

Flood Risk Sensitivity for Impact Assessment

12.5.102. For the construction assessment, the key receptor in terms of all forms of flood risk relates to construction workers present at the Site, who are considered to be of Very High sensitivity.

12.5.103. For the operational assessment, the importance is based on understanding of the receptors present within areas at risk of flooding (i.e. the Proposed Development, existing development and other infrastructure) from all flooding sources. As well as development, this

can include both operatives at the Site, or members of the public (where relevant) who are also classified as being of Very High sensitivity.

12.5.104. At this stage, it is assumed that the existing Keadby site, Proposed Development and National Grid Electricity Transmission (NGET) substation site are classified as Essential Infrastructure (Very High sensitivity). The vulnerability of other developments and infrastructure in the study area range from water compatible (low sensitivity) to more vulnerable (high sensitivity).

12.6. Development Design and Impact Avoidance

12.6.1. Measures to deliver compliance with industry good practice and environmental protection legislation during both construction and operation (e.g. in relation to prevention of surface and groundwater pollution) can be assumed in accordance with NPS EN-1 paragraph 4.12.10. It must be assumed that all measures available to regulators to secure such requirements will be properly applied and enforced by the relevant regulators. Most of the measures required are set out in the **Outline CEMP (Application Document Ref. 7.4**) which accompanies the ES report.

12.6.2. The following impact avoidance measures have either been incorporated into the design (i.e. embedded mitigation) or are standard construction or operational practices (i.e. essential mitigation). These measures have, therefore, been taken into account during the impact assessment and are secured by a Requirement within the **Draft DCO** (**Application Document Ref. 3.1**). The construction mitigation measures are included within the **Outline CEMP (Application Document Ref. 7.4**). The Contractor will be required to develop a final CEMP for implementation, in accordance with the requirements of the **Draft DCO** (**Application Document Ref. 3.1**).

Construction

Surface Water and Groundwater

12.6.3. During construction, water pollution may occur directly from spillages of polluting substances into waterbodies, or indirectly by being conveyed in runoff from hardstanding, other sealed surfaces or from construction machinery. Fine sediment may also be disturbed in waterbodies directly or also wash off working areas and hardstanding (including approach roads) into waterbodies indirectly via existing drainage systems or overland. This sediment may potentially contain contaminants that could be harmful to the aquatic environment. Due to

past industrial activity, this sediment may not be inert and may potentially contain contamination that could be harmful to the aquatic environment.

12.6.4. Prior to construction starting on-site, a final CEMP will be prepared by the Contractor(s) and will outline the measures necessary to avoid, prevent and reduce adverse effects where possible on the local surface water and groundwater environment. This will be detailed within a Water Management Plan (WMP) that will form a technical appendix to the final CEMP. An **Outline CEMP** (**Application Document Ref. 7.4**), which includes an Outline Water Management Plan in Appendix C, accompanies the ES Report.

12.6.5. The final CEMP will be reviewed, revised and updated as the project progresses towards construction to ensure all relevant potential impacts and residual effects are considered and addressed as far as reasonably practicable, in keeping with available good practice at that point in time. The principles of the mitigation measures set out below are the minimum standards that the Contractor will implement. However, it is acknowledged that for some issues, there are multiple ways in which they may be addressed. In addition, the methods of dealing with pollutant risk will need to be continually reviewed on-site and adapted as construction works progress in response to different types of work, weather conditions, and locations of work.

12.6.6. The potential for adverse effects would be avoided, minimised and reduced by the adoption of the general mitigation measures which are outlined in the following sections, and which will be described in the WMP in the final CEMP.

Good Practice Guidance

12.6.7. The following relevant Guidance for Pollution Prevention (GPP) have been released to date on the NetRegs website (Northern Ireland Environment Agency and Scottish Environment Protection Agency, 2024). While these are not regulatory guidance in England where the UK Government website outlines regulatory requirements, it remains a useful resource for best practice:

- GPP 1: Understanding your environmental responsibilities – good environmental practices (June 2021);
- GPP 2: Above ground oil storage tanks (June 2021);
- GPP 3: Use and design of oil separators in surface water drainage systems (March 2022);

- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer (June 2021);
- GPP 5: Works and maintenance in or near water (February 2018);
- GPP 6: Working at construction and demolition sites (April 2023);
- GPP 8: Safe storage and disposal of used oils (June 2021);
- GPP 13: Vehicle washing and cleaning (June 2021);
- GPP 19: Vehicles: Service and Repair (June 2021);
- GPP 20: Dewatering underground ducts and chambers (June 2021);
- GPP 21: Pollution Incident Response Planning (June 2021);
- GPP 22: Dealing with spills (October 2018); and
- GPP 26: Safe storage – drums and intermediate bulk containers (June 2021).

12.6.8. Where new GPP are yet to be published, previous (now withdrawn) Environment Agency Pollution Prevention Guidance (PPG) documents continue to provide useful advice on the management of construction works to avoid, minimise and reduce environmental impacts, although they should not be relied upon to provide accurate details of the current legal and regulatory requirements and processes. Construction phase operations would be carried out in accordance with guidance contained within the following PPG (Environment Agency, 2014), including:

- PPG7: Safe storage – the safe operation of refuelling facilities (2011); and
- PPG18: Managing fire water and major spillages (2000).

12.6.9. Additional good practice guidance for mitigation to protect the water environment can be found in a range of CIRIA documents and British Standards Institute documents described in Section 12.3. A full list will be provided in the final CEMP.

Management of Construction Site Runoff

12.6.10. The measures to manage fine sediment in surface water runoff as a result of construction activities are included in the **Outline CEMP** (**Application Document Ref. 7.4**) and the Outline WMP in Appendix C. This will be developed with further detail in the WMP (to accompany the final CEMP).

12.6.11. There are a wide range of measures that can be adopted by the contractor(s) to reduce the risk of excessive fine sediment in runoff (timing of works, minimising earthworks and seeding or covering them), to intercept runoff to prevent uncontrolled runoff from the Site (e.g. by

using cut off drains, fabric silt fences, bunds and straw bales, designated areas for cleaning plant and equipment, wheel washes and road sweepers), and to treat runoff to remove excessive levels of fine sediment (e.g. settlement lagoons, sumps, spraying on to land or even proprietary measures such as lamella clarifiers). Other measures to protect waterbodies from fine sediment runoff include storage of topsoil/ subsoil a minimum of 20m from watercourses on flat lying land (and further where any ground is sloping). It will be for the contractor(s) to continually monitor the need for measures depending on the nature of the works being undertaken the weather conditions, and the performance of sustainable drainage systems installed.

Management of Construction Spillage Risk

12.6.12. Measures will be implemented to manage the risk of accidental spillages and potential conveyance to nearby waterbodies via surface runoff or land drains. The measures relating to the control of spillages and leaks is summarised in the Outline WMP in Appendix C of the **Outline CEMP (Application Document Ref. 7.4**) and will be included in the WMP in the final CEMP and adopted during the construction works. Measures will be in accordance with prevailing pollution prevention legislation and following best practice guidance summarised earlier. They will include details of how fuel and other chemicals (including cement) will be stored, used on site, and equipment and plant cleaned, as well as how leaks and spillages will be prevented or remediated if needed. This will also include the implementation of a Pollution Prevention Plan and an Emergency Response Plan.

12.6.13. In addition, site welfare facilities will be appropriately managed, and all foul waste disposed of either to the existing Keadby 2 Power Station foul connection, or for the laydown areas south of the Stainforth and Keadby Canal, via a licensed waste contractor to a suitably permitted facility.

Use of Cofferdam at the Abstraction Point

12.6.14. As described in **ES Volume I Chapter 5** (**Application Document Ref. 6.2.5**), the Proposed Development will require use of a cofferdam in close proximity to the intake structure in the Stainforth and Keadby Canal. Use of a cofferdam is necessary in order to create a dry working environment which is safe for contractors to operate within. Assumptions in respect of the cofferdam are explained in **ES Volume I Chapter 5:** Construction Programme and Management (**Application Document Ref. 6.2**) and in Section 12.4 of this chapter.

12.6.15. Installation of any cofferdam in the Stainforth and Keadby Canal would require permission from the Environment Agency and CRT. Maintaining

a dry working area for any in-channel working using a cofferdam will reduce the overall channel disturbance and potential for mobilising fine sediment (and any contamination) into the water column and canal.

12.6.16. Any works would be undertaken in compliance with the Eels (England and Wales) Regulations 2009 (HMSO, 2009), which may require installation of an eel screen. A fish rescue would be required from the cofferdam before pumping out of water. All works would be undertaken in accordance with a Fish Management Plan, as described in **ES Volume I Chapter 11:** Biodiversity, Ecology and Nature Conservation (**Application Document Ref. 6.2**), which will be included within the final CEMP which is secured through a Requirement in the **Draft DCO (Application Document Ref. 3.1**).

12.6.17. Any cofferdam would be designed to minimise changes to the canal bed and bank erosion and toe scour by extending the minimum distance required into the channel. Silt curtains would be used to minimise impacts on water quality. Given the minimal flow in the Stainforth & Keadby Canal, scour risk here is not deemed to require additional protection.

12.6.18. Dewatering within the cofferdam area will be undertaken once any fine sediment has settled out such that it is consistent with the turbidity of the waterbody (Stainforth & Keadby Canal) and following any necessary fish rescue. The rate and location of the discharge will be controlled and carefully chosen to avoid further erosion of any nearby soft sediments.

12.6.19. Whilst in-situ, the cofferdam will be regularly inspected and maintenance undertaken, where required, and any water entering the cofferdam area via seepage will be disposed of appropriately (i.e. by pumping back into the waterbody).

Water Connection Corridors

12.6.20. Measures to reduce impacts and potential adverse effects within the Water Connection Corridors would include:

- implementation of a temporary site drainage system;
- completing a pre-works survey on affected land drains to record waterbody form and condition prior to works commencing;
- any required pump intakes would be appropriately screened to prevent fish being drawn into the pipe/ pump (noting that fish are unlikely to be present in land drains);

- no plant would track through any channel where works are to be undertaken but all work would be undertaken from the banks;
- crossings would be perpendicular to the channel where reasonably practicable; and
- measures to control effects relating to bed substrate would also be developed including careful storage of sediment layers to enable typical pre-construction habitats and hydromorphological processes to quickly re-establish following the works.

12.6.21. In addition to the cooling water connections, a connection would also be made on Chapel Lane to provide a public water connection, including works to the existing public water pipelines.

Water Discharge Corridors

12.6.22. It is proposed to re-use existing assets including the outfall and pipework for Keadby 1 Power Station for the discharge of treated effluent to the River Trent. A Water Discharge Corridor is included in the Site comprising the easement of the existing cooling water outfall corridor north east from Keadby 1 Power Station, connecting with the River Trent. Interconnecting pipework would extend from Proposed Site to connect to this infrastructure.

12.6.23. As part of refurbishment and/ or replacement works within the Water Discharge Corridor, various ancillary works may be required. It is not envisaged that upgrades to the existing Keadby 1 Power Station easement pipework will be necessary, however, if minor upgrades are required, trenchless excavation methods ('sliplining') would be applied to the existing pipeline. There will be no open cut pipeline replacement along the existing pipeline easement.

12.6.24. It is anticipated that it will be possible to re-use the existing outfall and that any maintenance activities are likely to be minor and limited to inspection and hand-based maintenance. This may be either shore-led or supported by small specialist workboats, comparable to those which are periodically used for Keadby Power Station operation and maintenance activities.

Partial infill of Drain D2 and complete infilling of Drain D4 and Drain A

12.6.25. Details of the drain alterations in the site are to be further developed, although it is currently anticipated that Drain D2 will be partially infilled and Drain D4 and Drain A will be fully infilled.

12.6.26. Measures are outlined in the **Outline CEMP (Application Document Ref. 7.4**) to mitigate potential impacts to the water bodies downstream of the drains.

12.6.27. The detailed design will need to ensure necessary drainage routes are maintained. In addition to the management of local site runoff this should also consider the movement of tidal and fluvial flood flows through and around the Site.

Mabey Bridge Replacement and Emergency Access Bridge over Drain D1

12.6.28. Early works will include the replacement of Mabey Bridge over the Hatfield Waste Drain to provide the permanent access into the Site. Best practice mitigation measures outlined above are included within the **Outline CEMP (Application Document Ref. 7.4)** and implemented to prevent adverse impacts to this watercourse during construction. Further details related to this activity are provided in **ES Volume I Chapter 5:** Construction Programme and Management **(Application Document Ref. 6.2**) .

12.6.29. An emergency access bridge is also proposed over Drain D1 (Glew Drain) to the north of Keadby Common and the Proposed Site. Initial site clearance will be undertaken including vegetation clearance. The channel beneath the proposed bridge crossing is likely to require lining to accord with IDB bylaws which seek to prevent vegetation growth, as this area will no longer be accessible to IDB machinery for maintenance. Piling works, if required, would then take place before the main structure of the bridge is constructed. Further details related to this activity are provided in **ES Volume I Chapter 5:** Construction Programme and Management **(Application Document Ref. 6.2**).

12.6.30. There may be a requirement for minor works to watercourse crossings relating to the temporary access roads for strengthening, maintenance or minor improvements. This could potentially impact drains in relation to the temporary construction laydown areas in the agricultural fields south of the Stainforth and Keadby Canal. Any such work would be subject to discussions with the relevant landowner.

Land Drainage

12.6.31. Appropriate measures to minimise short-term impacts on land drainage will be agreed with the relevant landowner for those works affecting drains within the temporary construction and laydown areas (refer to **ES Volume I Chapter 5:** Construction Programme and Management **(Application Document Ref. 6.2**)). Where land drains are under the

control of the IDB, as shown on **ES Volume III Figure 12.5:** Internal Drainage Board Assets **(Application Document Ref. 6.4.27),** relevant bylaws will be adhered to or consent obtained for works affecting/ crossing these drains within the Electrical Connection to the 400kV NGET Substation, Water Discharge Corridor and emergency vehicle access route shown on **ES Volume III Figure 3.3:** Indicative Parts of the Site Plan **(Application Document Ref. 6.4).** These measures will be secured in the final CEMP, noting that an **Outline CEMP** (**Application Document Ref. 7.4**) is included with the ES**.**

Management of Flood Risk

12.6.32. The final CEMP would incorporate measures aimed at preventing an increase in flood risk during construction works, as far as reasonably practicable. The **Outline CEMP** (**Application Document Ref. 7.4**) included with the ES incorporates measures to prevent an increase in flood risk during the construction works. Examples of such measures include:

- adequate containment of storage areas, to ensure that material does not wash away and cause pollution and damage to infrastructure;
- the construction laydown area site office and supervisor will be notified of any potential flood occurring by use of the 'Floodline Warnings Direct' service; and
- the Contractor will be required to produce a Flood Risk Management Action Plan/ Method Statement which will provide details of the response to an impending flood and include:
  - a 24 hour availability and ability to mobilise staff in the event of a flood warning;
  - the removal of all plant, machinery and material capable of being mobilised in a flood for the duration of any holiday close down period;
  - details of the evacuation and site closedown procedures; and
  - arrangements for removing any potentially hazardous material and anything capable of becoming entrained in floodwaters, from the temporary works area.

12.6.33. Due to the residual risk to construction personnel and equipment resulting from a breach of defences on the River Trent, construction works would not take place during times of high flow when there is a Flood Alert.

12.6.34. If water is encountered during below ground construction, suitable de-watering methods will be used. Any dewatering operations will be undertaken in line with the relevant legislation (for both abstraction and discharge).

12.6.35. Safe egress and exits are to be maintained at all times when working in excavations. When working in excavations a banksman is to be present at all times.

Management of Navigational Risk

12.6.36. Measures to mitigate against navigational risks associated with any in-channel works (such as the canal abstraction) are outlined in **ES Volume II Appendix 12C:** Navigation Risk Assessment (**Application Document Ref. 6.3**).

12.6.37. With the application of mitigation, it is considered that all risks can be managed to a level which is As Low as is Reasonably Practical (ALARP).

Water Usage

12.6.38. All abstractions and discharges will be obtained in line with the relevant legislation and consenting requirements from the Canal Rivers Trust, Environment Agency, Internal Drainage Board, North Lincolnshire Council and Yorkshire Water; including the relevant assessments of impacts on water resources and water quality.

12.6.39. Variations to the abstraction licence and discharge permit have been obtained for the Keadby CCS Power Station project cooling water abstraction and trade effluent discharge. Keadby Next Generation Power Station would be able to work within the quality and quantity parameters set within the amended licences/permits, although new/varied consents may be required due to changes such as additional uses . Where the consent requirements (not related to quality or quantity) differ from those stated within the licences or permits, appropriate applications for new or varied consents will be submitted.

12.6.40. The **Outline CEMP** (**Application Document Ref. 7.4**) outlines measures to be adopted by the contractor to improve water efficiency during construction, for both potable and non-potable end uses. The measures will draw on best practice from other construction schemes.

Operation

12.6.41. A number of embedded mitigation features would be incorporated into the design of the Proposed Development design in order to avoid, minimise and reduce potential impacts and adverse effects on water features, water resources and flood risk, and these are described in the following sections.

Surface Water Drainage

12.6.42. A new surface water drainage network and management system will be provided for the Site that will provide adequate interception, conveyance, treatment, and attenuation of surface water runoff from buildings and hard standing. The proposed concept drainage strategy is provided in the Drainage Strategy in Annex 3 of **ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)**. The detailed design of the surface water drainage system is secured by a Requirement in the **Draft DCO (Application Document Ref. 3.1)**.

12.6.43. The proposed surface water drainage system is to include the use of sustainable drainage systems (SuDS) to provide treatment of runoff from areas where there is a low risk of contamination by any chemicals used by the energy generation processes to ensure potential adverse effects on water quality and habitat of receiving water bodies are avoided. The drainage system will be designed to be inherently safe and protect the local environment from diffuse pollutants that may be present. Clean surface water runoff will be segregated from contaminated/ potentially contaminated water, which will be directed to on-site treatment plant or for off-site disposal, where applicable. Gravity drainage is also used wherever practicable. SuDS and the treatment train will be selected and assessed with reference to the SuDS Manual (CIRIA, 2015a) and the Simple Index Approach contained therein.

12.6.44. The maintenance required for SuDS and drainage networks will be based on standard guidance and practice. Requirements for maintenance and management of vegetated drainage systems (e.g. ponds) are described in The SuDS Manual (CIRIA, 2015) and DMRB CG 532 (Highways England, 2020).

Canal Abstraction

12.6.45. The abstraction licence for Keadby 2 Power Station (MD/028/0083/014) was varied in 2022/2023 to include the abstraction required for the Keadby CCS Power Station project. As the Proposed Development is an alternative to the Keadby CCS Power Station and will require the

same (or less) cooling water as Keadby CCS Power Station, the Applicant proposes to use the obtained licence for the Proposed Development. The Applicant would work to the conditions of the licence including existing cessation requirements. Where the consent requirements (not related to quality or quantity) differ from those stated within the licence, an abstraction variation application will be submitted.

Process Water Treatment

12.6.46. Following neutralisation, process water that is to be directed to the outfall would flow via the existing Keadby 1 Power Station cooling water culvert. The Environmental Permit variation for Keadby CCS Power Station includes emission limits which apply to the discharge point into the cooling water culvert rather than the eventual outfall in the River Trent. A new or varied environmental permit application may be submitted, but the Proposed Development would be able to work within the consented parameters for Keadby CCS Power Station .

River Trent Outfall

12.6.47. Cooling water will be discharged at a rate, temperature and chemical water quality compliant with the discharge limits set by the Environment Agency within the Environmental Permit, considering Best Available Techniques (BAT) for those discharges. This will include consideration of the requirements of the Eels Regulations.

Management of Hazardous Substances on Site

12.6.48. The use of the chemical products at the Site will follow the product-specific environmental guidelines, as well as the legislative requirements set out in the Control of Substances Hazardous to Health Regulations (COSHH (2002) and Control of Major Accident Hazards (COMAH) Regulations (2015).

12.6.49. A site Emergency Response Plan (prepared for Regulation 9 of the COMAH Regulations) will be in place for dealing with emergency situations involving loss of containment of hazardous substances. This will detail how to contain and control incidents to minimise the effects and limit danger to persons, the environment and property. The Emergency Response Plan will set out the emergency spill control procedure that will include the actions adapted from the Health and Safety Executive's Emergency Response / Spill Control Technical Measures Document (Health and Safety Executive, n.d.).

12.6.50. Further guidance to be consulted in development of the site Emergency Response Plan will include:

- HSG191 Emergency planning for major accidents. Control of Major Accident Hazards Regulations 1999 (Health and Safety Executive, 1999);
- HSG71 Chemical warehousing: the storage of packaged dangerous substances (Health and Safety Executive, 2009); and
- BS 5908: Code of practice for fire precautions in the chemical and allied industries (British Standards Institute, 2012).

Flood Risk during Operation

12.6.51. Mitigation measures are required to protect the Proposed Development from the residual risk of flooding in the event that the existing tidal defences fail in the vicinity of the Site, or in the event of heavy rainfall that could result in surface water flooding at the Site if the design capacity of the drainage network is exceeded.

12.6.52. A number of flood resistance/ resilience measures are included in **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**) for consideration at the detailed design stage of the Proposed Development.

12.6.53. In order to protect against the residual risk of breach and the future risk from defence overtopping, the critical operational equipment and infrastructure will be raised above the modelled breach level during the 0.5% AEP plus climate change tidal event. Wholesale land raising of the Site is not proposed.

12.6.54. The main developed parts of the Site will be raised to 3 m AOD, the critical operation infrastructure raised to a level of 4.1m AOD (the CFL + 300mm) where reasonably practical to do so, or a minimum of 1.0m above the development platform level (4.0 m AOD). A minimum finished floor level of 3.3 m AOD has been defined for manned building. Safe refuge will be available for staff working within the other parts of the main area of the Site.

12.6.55. The A18 gatehouse will be occupied on an ad-hoc basis, for example during maintenance when there is a high volume of deliveries. Ground raising is not proposed, although safe refuge will be provided within the building and the building will be designed to withstand rapid breach flows.

12.6.56. Further detail on additional resilience and mitigation measures is provided in Section 5 of **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**).

Water Usage

12.6.57. All abstractions and discharges will be obtained in line with the relevant legislation and consenting requirements from the Canal and River Trust, Environment Agency, Internal Drainage Board, North Lincolnshire Council and Yorkshire Water; including the relevant assessments of impacts on water resources and water quality. Discussions are ongoing with stakeholders.

12.6.58. The Cooling Water abstraction is discussed in further detail in paragraph 12.6.45. A connection would be made within the Site to provide a public water connection for domestic and sanitary water usage.

Decommissioning

12.6.59. At the end of its design life, decommissioning of the Proposed Development will see the removal of all above ground equipment down to ground level. It is assumed that all underground infrastructure will remain in-situ; however, all connection and access points will be sealed or grouted to ensure disconnection. At this stage it is assumed that decommissioning impacts are expected to be limited and will be the same/similar to the construction impacts, as discussed above.

12.6.60. The Proposed Development would be subject to decommissioning under the conditions of the Environmental Permit including conditions relating to chemical/ polluting material handling, storage and use and emergency procedures in line with BAT. A Decommissioning Environmental Management Plan (DEMP) is secured by a Requirement in the **Draft DCO (Application Document Ref. 3.1)** and will be prepared and agreed with the Environment Agency to identify required measures to prevent pollution during this phase of the Proposed Development, as part of the Environmental Permitting and site surrender process at the appropriate time and is separate to the DCO application.

12.6.61. The DEMP will consider in detail all potential environmental risks and contain guidance on how risks can be removed, mitigated or managed. This will include details of how surface water drainage should be managed on the Proposed Main Site during decommissioning and demolition. The DEMP will also consider the impacts from leaving materials in the ground permanently following decommissioning and any monitoring/maintenance required, including the scenario where materials have to removed.

12.7. Likely Impacts and Effects

12.7.1. The Proposed Development has the potential to cause adverse effects to the water environment during construction, operation and decommissioning phases. Water resources described in Section 12.5 have therefore been assessed for the likelihood of actual effects occurring as a result of these phases of the Proposed Development (taking into account the mitigation measures as detailed in Section 12.6).

Construction Phase

Surface Water Quality – Suspended Fine Sediments

12.7.2. Taking into consideration the source-pathway-receptor approach, construction of the cofferdam required in the Stainforth and Keadby Canal for the cooling water abstraction intake or use of the Waterborne Transport Offloading Facility for Abnormal Indivisible Loads could cause some mobilisation of fine sediments, and this may mobilise some fine sediment into the water column (the pathway). However, the volume of sediment will be relatively small and localised. In the case of the River Trent, background data shows that concentrations of TSS are often quite high which is supported by operational experience.

12.7.3. Once the cofferdam has been installed, any fine sediment that has been mobilised will quickly dissipate through settling or dispersion and is unlikely to create a plume that may propagate into the wider waterbody. The purpose of the cofferdam is to allow a dry working area to be created, which in itself is a measure designed partly to reduce adverse impacts on water quality.

12.7.4. The cofferdam will be designed to minimise changes in riverbed and bank erosion and toe scour through keeping it to the minimum dimensions necessary to undertake the works and thereby reducing any constriction of the channel. Furthermore, this would reduce the extent of sediment mobilisation. The structures would not protrude significantly into the channel (up to circa 20m working area for the Stainforth and Keadby Canal during construction), taking into account similar works within these watercourses for the purposes of Keadby 2 Power Station.

12.7.5. There is a wealth of sedimentological data from both the Keadby power Station intake and outfall which has been obtained in order to fulfil the existing Marine Licence Application ‘MLA/2014/00183/2’ and associated mid-point sample returns.

12.7.6. Any requirement for pre-construction sampling within the Stainforth and Keadby canal prior to works required for the Canal Water Abstraction cofferdam would be agreed with the relevant regulators.

12.7.7. With reference to Table 12.5 and the embedded and essential mitigation measures (described in Section 12.6) in place, it is considered that there would be negligible magnitude of impact to the River Trent from any waterborne transport, given the scale of the watercourse and control measures. The tidal nature of the estuary here would quickly disperse any mobilised sediments. Given that the River Trent is a very high importance receptor (Table 12.4), considering the classification of effects matrix in Table 12.6, this negligible impact would result in a slight adverse effect (**not significant**).

12.7.8. Construction of the abstraction point behind a cofferdam in the Stainforth and Keadby Canal would have a minor adverse magnitude impact given that there is less ability to quickly disperse any sediment in this waterbody given the low flow. This minor adverse impact would be very localised and temporary in nature. It will be necessary to consider appropriate cofferdam installation in order to ensure no impact to the canal liner at the abstraction point, and this may include bolstering the liner with clay. Given appropriate cofferdam design, the overall impact is considered to be minor adverse on the high importance Stainforth and Keadby Canal. This would result in a slight adverse effect (**not significant**).

12.7.9. Works to Drain D2 (partial infilling), Drain D4 (infilling) and Drain A (infilling) could mobilise sediments (source) and be directly mobilised (pathway) into the watercourse (receptor) which could then also propagate further downstream. Given the localised and temporary nature of the works the magnitude of impact is considered minor, and will be largely mitigated through the measures outlined in Section 12.6, and measures included within the **Outline CEMP** (**Application Document Ref. 7.4**). This would result in a slight adverse effect (**not significant**). Given the embedded and essential mitigation measures, no adverse effect is anticipated to downstream waterbodies.

12.7.10. The construction of a replacement clear span bridge (Mabey Bridge) over Hatfield Waste Drain and a new clear-span emergency access bridge over Drain D1 (Glew Drain) will require works in the riparian margins and over these two watercourses, with potential piling and use of other plant leading to mobilisation of sediment that could be conveyed into the watercourses given the immediate proximity of the works.

12.7.11. These works would be carried out in accordance with the measures in the final CEMP (to be prepared in accordance with the **Outline CEMP (Application Document Ref. 7.4)**) and the best practice measures outlined in Section 12.6. Given that no work would be required within the channels themselves, other than works to line the channel of Drain D1 to comply with IDB bylaws, and that the foundations will be set back from the watercourses, any adverse impacts would be negligible. For the high importance Hatfield Waste Drain and North Engine Drain this would give a slight adverse effect (**not significant**). For the medium importance Drain D1 (Glew Drain) this would also give a slight adverse effect (**not significant**).

12.7.12. There is likely to be strengthening, maintenance or minor improvement works to existing watercourse crossings relating to the temporary access roads during construction. This may impact existing crossings of drains. At this stage it is not clear the extent of any works required; however, they are assumed to be no more than minor alterations to the existing structures. As any improvement works would be immediately adjacent to, and/ or over these drains, there is potential for mobilisation and conveyance of fine sediments to the channels. Given implementation of the best practice mitigation measures outlined in the **Outline CEMP (Application Document Ref. 7.4)**, this impact would be minor and temporary. For the medium importance drains this would give a slight adverse effect (**not significant**), while for the low importance drains this would give a neutral effect (**not significant**).

12.7.13. There are also existing access route crossings via North Pilfrey Bridge of the North and South Soak Drain (high importance) and Stainforth and Keadby Canal (high importance), which will be used. No works are proposed to North Pilfrey Bridge. However, there will be construction work in close proximity to South Soak Drain and North Soak Drain which could result in runoff of fine sediment towards them. There will also be works in close proximity to the unnamed drainage ditch alongside the access road from Mabey Bridge (low importance). Given the embedded and essential mitigation measures described in Section 12.6 including standoff distances included in relation to laydown areas (minimum 20m from high importance receptors), any adverse impact is expected to be negligible, resulting in a slight adverse (**not significant**) effect to North and South Soak Drain and the Stainforth and Keadby Canal, and a neutral (**not significant**) effect to the unnamed drain. No adverse effects on downstream waterbodies are anticipated from this source i.e. the Torne/Three Rivers waterbody or the River Trent.

Surface Water and Groundwater Quality – Chemical Spillages

12.7.14. Leaks and spillages of polluting substances during construction could potentially pollute nearby surface watercourses and groundwater bodies if their use or removal is not carefully controlled (source) and spillages enter existing flow pathways or waterbodies directly (pathway). Like excessive fine sediment in construction site runoff, the risk is greatest where works occur close to and within waterbodies (the receptor). However, to ensure legislative compliance, storage, handling and disposal of such substances will need to be in place prior to and during construction via the final CEMP.

12.7.15. No construction works are proposed within the River Trent, with works limited to waterborne transport. Given the scale of the waterbody with significant dilution potential, embedded and essential mitigation measures implemented (described in Section 12.6), including potential water quality monitoring, there would be a negligible impact on the very high importance River Trent. This would give a short-term slight adverse effect (**not significant**).

12.7.16. Within the Stainforth and Keadby Canal (high importance waterbody), the risk relating to chemical spillages during installation of the potential Canal Water Abstraction Option would be negligible given the implementation of best practice measures (see Section 12.6) and the use of a cofferdam to isolate the majority of the works, causing a slight adverse effect (**not significant**).

12.7.17. Works would be undertaken in close proximity to the high importance Hatfield Waste Drain and high importance North Soak Drain which crosses into the Proposed Development boundary adjacent to the potential canal abstraction point. Given the implementation of mitigation measures which will be specified in the final CEMP (and based on those outlined in the **Outline CEMP (Application Document Ref. 7.4)**), any impact from chemical spillages to these watercourses is anticipated to be negligible, giving a slight adverse effect (**not significant**) for the high importance Hatfield Waste Drain and North Soak Drain, and neutral effect (**not significant**) for the medium importance Drain D1.

12.7.18. The medium importance Drain D2 is expected to be directly worked on. Given that open-cut works carry a greater risk of chemical spillages directly into the channel, this would be a temporary minor adverse impact, giving a slight adverse effect (**not significant**).

12.7.19. Strengthening, maintenance or minor improvements of existing crossings of medium importance drains and low importance drains pose a risk of chemical spillage given works would occur immediately adjacent to the channel and may impinge on the channel itself where structures need improvement within the channel. There may also be works close to the unnamed drainage ditch (including regular vehicular movements) adjacent to the access road from Mabey Bridge. There is therefore potential to receive spillages during construction, but given the mitigation measures described above, this would result in a temporary minor adverse impact to these drains, giving a slight adverse effect (**not significant**) for medium importance drains and neutral effect (**not significant**) for low importance drains.

12.7.20. Given the essential mitigation outlined in the **Outline CEMP (Application Document Ref. 7.4)** (in line with Environment Agency pollution prevention guidance) to deal with chemical spillages there is expected to be no impact to any other waterbody or downstream waterbodies (e.g. River Torne/Three Rivers).

Morphological Effects to Waterbodies relating to the use of a Cofferdam

12.7.21. The installation of a cofferdam will result in the localised loss of habitat on the bed of the Stainforth and Keadby Canal beneath its footprint. However, any cofferdam will be designed to minimise changes in riverbed and bank erosion and will be designed to provide the minimum dimensions necessary to safely undertake the required works, thereby reducing any constriction of the channel as far as reasonably practicable.

12.7.22. Scour impacts are not anticipated in the Stainforth and Keadby Canal given the low flow within the watercourse. However, the less dynamic nature of the watercourse means that any minor impact that may occur would likely require a longer recovery time.

12.7.23. The impact on the Stainforth and Keadby Canal would be minor adverse given the slower probable recovery of the bed to any disturbance, giving a slight adverse effect (**not significant**) on this low importance (for morphology) receptor.

Morphological Effects to Waterbodies: New Bridges and Crossings for the Connection Corridors and Access

12.7.24. The replacement bridge over the Hatfield Waste Drain and new bridge over drain D1 are anticipated to have negligible impact on the morphology of the bed itself as they are of a clear span design with set back foundations and so would not impact the channel itself. However,

there would be localised impact to riparian habitats on the banks and potential increase in channel shading (see **ES Volume I Chapter 11** (**Application Document Ref. 6.2.11**)). Both Hatfield Waste Drain and drain D1 are of low importance for morphology, and so the negligible impact on their morphology would give a neutral effect (**not significant**).

12.7.25. Any minor improvement works required to the existing crossings of low importance (for morphology) drains are not expected to significantly alter the footprint of the structures, and any impact on morphology would again be negligible, giving a neutral effect (**not significant**).

Physical Effects to Waterbodies: Loss of Drain D4 and Drain A, and partial infilling of Drain D2

12.7.26. Drain D2 is of low importance for morphology, due to being artificially straight, lacking significant geomorphic and bedform features. The Drain will be partially infilled and as such there will be a permanent adverse impact on the watercourse and riparian habitats, and the hydrological and sediment regimes during construction. These impacts would be localised to the Drain. Overall, physical works to Drain D2 would give a moderate adverse impact against hydromorphological status, resulting in a slight effect (not significant) which would have limited impact at the scale of the wider hydrology.

12.7.27. Construction of the Proposed Site could result in the loss of two minor field drains (Drain D4 and Drain A – see **ES Volume III Figure 12.1:** Surface waterbodies and their Attributes (**Application Document Ref. 6.4**)) which would be infilled and built over. Drain D4 is straight, 400m long, approximately 1m wide and 10cm deep, whilst Drain A is shorter, approximately 1m wide and 20cm deep (depths noted at time of the surveys for the PEA (**ES Volume II Appendix 11C:** Preliminary Ecological Appraisal (**Application Document 6.3**). Drain D4 channel is dominated by silt and largely overgrown with a very limited diversity of aquatic and wetland macrophyte species in the summer. It lacks hydromorphic bedform features (e.g. riffles, pools, localised meanders) and is not known to be of any significant biodiversity, social, or economic value. Likewise Drain A lacks hydromorphic bedform features and is dominated by Phragmites australis (common reed).

12.7.28. Given the limited existing morphological or biodiversity value of these drains, it is considered that the impact arising from habitat loss can be readily compensated through sensitive design of the surface water attenuation infrastructure required by the Proposed Development, which includes a series of swales. Furthermore, there will be habitat

enhancement works. The surface water drainage is secured as a Requirement of the **Draft DCO (Application Document Ref. 3.1).**

12.7.29. Consent would need to be obtained through consultation with the IoAaNNWLMB given hydrological links to IDB maintained watercourses, and consultation will therefore be continued to agree any relevant mitigation measures required.

12.7.30. Given the low quality of the Drain D4 and Drain A habitats and potential new habitat creation, the magnitude of the impact is considered moderate adverse. As Drain D4 and Drain A is a low importance receptor for morphology (with an estimated Q95 below 0.001m3/s), this results in a slight adverse effect (not significant).

Navigational Risk Assessment

12.7.31. The Stainforth and Keadby Canal water abstraction options would involve the construction and eventual removal of a cofferdam which may involve the use of a barge or large workboat. The presence of work boat(s) and presence of the cofferdam itself may constrain vessel passage along the watercourses, and it may also act as distraction to mariners.

12.7.32. For the River Trent water discharge outfall, only minor primarily hand-based maintenance activities would be undertaken. This may be either shore-led or supported by small specialist workboats, comparable to those which are periodically used for Keadby Power Station operation and maintenance activities. Hazards are predicted to be minimal and associated with the presence of a workboat in the River Trent.

12.7.33. With regard to AIL movements, on final approaches to Railway Wharf, the presence of a large vessel (i.e. of up to 82m in length and 12m in beam) may present a hazard to other mariners through collision. This may include another vessel or a fixed object, such as a mooring, wharf or other vessels using the River Trent. The operation of a large vessel may distract other mariners.

12.7.34. During the final approach and docking itself, the manoeuvring of a large vessel and support craft (i.e. tug) within the River Trent may constrain the passage of other mariners. During the use of the NAABSA (not always afloat but safely aground) berth, depending on the condition of the riverbed, the vessel may not achieve a stable unloading position. Listing into the Trent may cause a hazard to other mariners. The docking and unloading of a large vessel may also distract other

mariners, including through the use of wharf/vessel illumination during hours of darkness.

12.7.35. Whilst docked, vessel mooring or docking failure(s) may pose a hazard to both other mariners using the River Trent and neighbouring fixed objects; and whilst docked, the presence of a vessel may pose a risk to users of the Stainforth and Keadby Canal.

12.7.36. Studies were previously undertaken for the Keadby CCS Power Station project, using a 'Worst Credible Scenarios' approach to understand the location and nature of any navigational risks; a variety of mariners were considered ranging from small unpowered "vessels" and recreational craft to very large commercial vessels known to use the port approaches.

12.7.37. In all instances, the identified risks were 'low' or in some instances, 'medium' (in relation to workboats in the River Trent, and AIL movements at the Waterborne Transport Offloading Area. With the application of the proposed mitigation, it is considered that all risks can be reduced to ALARP and can be suitably managed by risk control protocols to reduce them to an acceptable level. The primary risk reduction measures included within the **Outline CEMP** (**Application Document Ref. 7.4**) are:

- engagement and collaboration with ABP Humber and CRT to inform the final approach to works and activities in the River Trent and Stainforth and Keadby Canal such that they have a minimal risk of disruption to the mariner;
- a suite of conditions, such as final CEMP and method statement returns, to ensure that ABP Humber and other relevant stakeholders are informed on final proposals;
- conditions to ensure mariners are made fully aware of works such that they can plan safe passage; and
- 'standard-set' marking, lighting and warning conditions to ensure any mariners are aware of the works and activities in the River Trent and Stainforth and Keadby Canal.

12.7.38. In EIA terms, the overall magnitude of impact is considered minor for the River Trent and the Stainforth and Keadby Canal. Both are high importance receptors for navigation, resulting in a slight adverse effect (**not significant**) in relation to navigational risk at both watercourses.

Potential Flood Risk – Tidal and Fluvial Sources During Construction

12.7.39. Taking into account implementation of standard construction methods and mitigation as described in the Section 12.6, which would be included in the **Outline CEMP** (**Application Document Ref. 7.4**), flood risk during construction would be effectively managed. A Flood Management Action Plan/ Method Statement will provide details of the response to an impending flood and will ensure that flood warnings are received from the Environment Agency's 'Floodline Warnings Direct' service to inform if there is a risk of flooding from a tidal storm surge type event which could result in overtopping or breach of defences. As described in Section 12.6, construction works would not take place during times of high flow when there is a Flood Alert.

12.7.40. Given these measures, the magnitude of flooding from these sources on very high importance construction workers, on site and further downstream, is considered to be negligible resulting in a slight adverse effect (**not significant**).

12.7.41. Flood risk to other receptors during construction will be no greater than the risk identified for the operational flood risk, on the basis that an appropriate temporary drainage system is implemented in line with the **Outline CEMP** (**Application Document Ref. 7.4**) requirements.

Potential Flood Risk – Surface Water Sources During Construction

12.7.42. The Site would in general be at very low to low risk from surface water flooding, although in some areas associated with watercourses there are areas of medium to high risk as outlined in the baseline and **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**). During the works, existing surface flow paths may be disrupted and altered due to site clearance, earthworks, and excavation work. The exposure and compaction of bare ground and the construction of new embankments and impermeable surfaces may increase the rates and volume of runoff and increase the risk from surface water flooding. However, with the implementation of standard construction methods and mitigation measures (see Section 12.6), this risk can be effectively managed. As such, the magnitude of flooding from these sources on very high importance construction workers is considered to be negligible resulting in a slight effect (**not significant**).

12.7.43. Flood risk to other receptors during construction will be no greater than the risk identified for the operational flood risk, on the basis that an appropriate temporary drainage system is implemented in line with the **Outline CEMP** (**Application Document Ref. 7.4**) requirements.

Potential Flood Risk – Groundwater Sources During Construction

12.7.44. The Site is considered to be at low risk of flooding from groundwater sources. Excavation of any cuttings has the potential to liberate groundwater in some areas, and open excavations in some locations may also be more prone to becoming inundated by groundwater. With the implementation of the measures outlined in the **Outline CEMP** (**Application Document Ref. 7.4**), (presented in Section 12.6), a negligible magnitude of impact is predicted resulting in a slight effect (**not significant**) on very high importance construction workers.

12.7.45. Flood risk to other receptors during construction will be no greater than the risk identified for the operational flood risk, on the basis that an appropriate temporary drainage system is implemented in line with the **Outline CEMP** (**Application Document Ref. 7.4**) requirements.

Potential Flood Risk – Drainage Infrastructure and Artificial Sources During Construction

12.7.46. The Proposed Development is at low to very low risk of flooding from existing drainage infrastructure. With the implementation of the measures outlined in the **Outline CEMP (Application Document Ref. 7.4),** and other flood risk mitigation as outlined in Section 12.6, flooding from these sources is considered to be negligible resulting in a slight effect (**not significant**).

12.7.47. Environment Agency mapping and the FRA (**ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)** indicates that the Site is not at risk of flooding from reservoirs (no effect), and at low risk from artificial waterbodies given proximity to the Stainforth and Keadby Canal. As such, the risk of flooding from artificial sources (canal) is considered to have a slight effect (**not significant**) on very high importance construction workers.

12.7.48. Flood risk to other receptors during construction will be no greater than the risk identified for the operational flood risk, on the basis that an appropriate temporary drainage system is implemented in line with the **Outline CEMP (Application Document Ref. 7.4**) requirements.

Operation Phase

Potential Pollution of Surface Watercourses and Groundwater: Surface Water Routine Runoff and Accidental Spillages

12.7.49. Throughout its lifetime, the Proposed Development would be regulated by the Environment Agency through an Environmental Permit and potentially also by the HSE through a COMAH Licence, if required, which would control the handling, storage and use of hazardous materials, including emergency procedures in line with the use of BAT. These measures would be in place to prevent pollution during plant operation in accordance with the consents.

12.7.50. The Conceptual Drainage Strategy included as an annex to the FRA (**ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)** will include SuDS in line with North Lincolnshire Council's SuDS and Flood Risk Guidance Document (North Lincolnshire Council, 2017). This will enable attenuation of surface water flows due to increases in the impermeable area as a result of the Proposed Development. SuDS would also provide treatment of runoff to ensure potential adverse effects on water quality are avoided.

12.7.51. Using the source-pathway-receptor approach, the source of pollution would be potential contaminants on impermeable surfaces (e.g. metal from vehicles on roads) which are transferred by the pathway of surface water runoff to Drain 1 (the receptor), subject to consent from the IDB.

12.7.52. The SuDS Manual's Simple Index Approach (CIRIA, 2015a) will be applied to assess the suitability of an assumed attenuation pond for surface water runoff and spillages (from non-process areas). See the Conceptual Drainage Strategy included as an annex to the FRA (**ES Volume II Appendix 12A (Application Document Ref. 6.3)** The Drainage Strategy to be developed at the detailed design stage will ensure that suitable treatment is provided prior to discharge to any watercourse in order to not adversely impact water quality of receiving waterbodies.

12.7.53. As described in **ES Volume I Chapter 4:** The Proposed Development (**Application Document Ref. 6.2**), an inventory of hazardous substances used on the Site will be developed through the detailed design process. In each case, the product will have a Material Safety Data Sheet providing guidance on safe disposal of waste chemicals. It is assumed that during operation of the facility, the disposal of product containers and chemical waste will adhere to this guidance, and the impact avoidance measures above and discussed in Section 12.6.

12.7.54. The Drainage strategy requires provisions for dealing with chemical spillages. Spillages within the Site will be treated as per the pollution prevention measures described within the impact avoidance measures (Section 12.6), and spilt substances collected and disposed of as per their individual requirements. Areas where pollutants are stored and spillages are likely will be bunded, and oil interceptors will be fitted with alarms. Penstocks will be provided to isolate any spills or contaminated water/ fire water in the surface water drainage system and prevent its discharge to the environment. An Emergency Response Plan would also be prepared and implemented as part of the Site's EMS. Should any spillage occur, the Environment Agency would immediately be informed, or Severn Trent Water should it impact the foul water system.

12.7.55. A Surface Water Maintenance and Management Plan will be prepared during the detailed design phase post-DCO consent to describe the requirements for access and frequency for maintaining drainage infrastructure on the Site. The maintenance regime must be fully implemented throughout the lifetime of the Proposed Development to avoid issues such as blockages which could lead to flooding, or failure of the spillage containment and pollution prevention systems.

12.7.56. Given that the Drainage Strategy will have to meet standards required by the environmental permit and the expected local policy requirements, and that measures will be in places for dealing with spillages and fire water then a negligible impact is predicted to Drain 1 from surface water drainage. Given that this is a medium importance receptor, this would result in a neutral effect (**not significant**).

12.7.57. Should IDB consent not be granted to discharge to Drain 1, then the outfall to the River Trent would instead be used, subject to Environment Agency consent, the controls of an Environmental Permit and any associated monitoring requirements. There would be a negligible impact to the River Trent given the mitigation measures and large dilution capacity of the watercourse, resulting a slight adverse effect (**not significant**) due to it being a high importance receptor.

Potential Impacts on Water Quality of the River Trent from Operational Discharges

12.7.58. Treated effluent from the Site (the source in the source-pathway-receptor approach) will discharge (the pathway) to the River Trent (the receptor) under an environmental permit. It is anticipated that the rate of discharge from the Proposed Development will be no greater than the volume currently consented for Keadby CCS Power Station and be

discharged intermittently, in combination with the 0.1 m^3/s consented for Keadby 2 Power Station and 15m^3/s consented for Keadby 1.

12.7.59. Discharge of treated effluent may require a variation or new permit from the Environment Agency to appropriately capture the proposed discharge. The permit will specify the effluent quality required to maintain the status of the receiving waters, although the discharge is anticipated to be in line with the currently consented Keadby CCS Power Station . Effluent will be monitored prior to discharge in compliance with the conditions of this permit. It should be noted that as per the Keadby CCS Power Station and Keadby 2 Power Station Permit Variation that the effluent quality limits (and associated monitoring) will apply at the point of discharge within the Keadby 1 Power Station cooling water culvert, not at the River Trent outfall point.

12.7.60. On the basis that the discharge will be in line with already consented discharge permits, it is considered that there will be negligible impact on temperature status of the River Trent, and the discharge would not prevent a barrier to migratory routes for fish. For the very high importance River Trent, this negligible impact would give a slight effect (**not significant**). Engagement with the relevant stakeholders – principally the Environment Agency – has been previously undertaken to help inform the EIA process. In addition, the choice of cooling technique and the associated water source has been selected in accordance with an appraisal of BAT considering the BAT hierarchy and evaluating the efficiency benefits and environmental effects of the different techniques available.

12.7.61. Water sampling facilities are to be provided for manual sampling of water prior to discharge. The frequency of testing and parameters will be agreed with the Environment Agency.

12.7.62. Given the requirements for the effluent from the Proposed Development to meet conditions of an Environmental Permit, it is considered that there is limited potential for pollution from the outfall, especially given the large capacity for dilution and dispersal offered by the Trent waterbody. As such, a negligible impact is predicted at this stage, with no changes likely to impact on WFD classifications for the larger waterbody. Given that the outfall is to a very high importance receptor, this results in a slight effect (**not significant**).

Demand for Water (Cooling Abstraction)

12.7.63. The Keadby 2 Power Station abstraction licence (MD/028/0083/014) was varied in 2022/2023 to include the abstraction required for the Keadby CCS Power Station project. As the Proposed Development is

an alternative to Keadby CCS Power Station, with a lower cooling water demand, this abstraction licence is anticipated to be re-allocated to the Proposed Development. The Applicant will review whether a variation is required to capture all proposed uses of the abstracted water.

12.7.64. Given that there is no proposed variation to the quality or quantity limits on the abstraction licence which has been consented, a negligible impact is predicted on water availability from these sources. This gives a neutral effect (**not significant**) on the Stainforth and Keadby Canal as a high importance receptor.

Foul Water Discharge

12.7.65. All foul water from welfare facilities from the Proposed Development is intended to be directed via the existing foul water sewer for Keadby 2 Power Station to the Severn Trent Water pumping station on Chapel Lane, and from there to the nearest wastewater treatment works (WwTW). It has been assumed that given the relatively small volumes involved, that Severn Trent Water will have adequate capacity to provide treatment within current permit standards. This will be confirmed through ongoing consultation with Severn Trent Water. If the pipeline condition is not suitable for continued use, foul sewage would instead be treated on site in a package treatment plant with the treated water directed to the River Trent via the water discharge connection under the conditions of an Environmental Permit.

12.7.66. For the purposes of this assessment, it has been assumed that the Severn Trent Water WwTW or the on-site package treatment plant will treat foul water prior to discharge to any waterbodies in accordance with requirements to not cause deterioration or prevent improvement under the WFD. On this basis, the impact of foul water discharges on the River Trent is considered to be a neutral (**not significant**) effect.

Flooding from Tidal Sources during Operation

12.7.67. It has been determined in the FRA (**ES Volume II Appendix 12A (Application Document Ref. 6.3)**) that the Site is at a 'low' risk of flooding from tidal sources with the defences in place.

12.7.68. Over the lifetime of the development the risk is potentially more significant. Flooding is shown to reach the Main Site with significant flood depths, particularly for the precautionary design lifetime (to 2105), not allowing for defence improvements to mitigate the effect of climate change.

12.7.69. In the event that the defences were to breach, the hazard to the Site in its unmitigated state would be 'high' as flood waters would enter the area. The flood levels resulting from a breach event are higher than those that would be expected from overtopping of the defences and therefore represent a conservative flood level on the Site. However, the probability of a breach occurring is 'low', meaning that the residual risk remains 'low'.

12.7.70. As described in Section 12.6 and the FRA (**ES Volume II Appendix 12A (Application Document Ref. 6.3**)), a range of mitigation measures are proposed to mitigate flood risk so that the occupiers of the Site are safe and critical operational infrastructure can continue to function at the Site in the event of such inundation. This would include a Flood Emergency Response Plan, and allocation of a place of safe refuge.

12.7.71. Tidal flood risk to the Proposed Development, which is considered essential infrastructure of Very High Importance, will be mitigated through the embedded and essential mitigation. As such, along with the implementation of the drainage strategy and flood resilience measures, a negligible impact to the Proposed Development is anticipated at this stage, resulting in a slight effect (**not significant**). Other Essential Infrastructure within the area, including the existing Keadby and National Grid sites, are assumed to also be appropriately protected by flood resilience measures.

12.7.72. The FRA (**ES Volume II Appendix 12A (Application Document Ref. 6.3))** notes the increases in maximum flood depths due to the Proposed Development are typically minor in comparison with the existing flooding shown and are not considered to make any material change to the flood risk for the affected land, properties and infrastructure. The findings have been shared with the EA who confirmed they are acceptable. These breach scenarios are unlikely to occur in practice as they require a major defence failure to occur in combination with the tidal flood event. In addition they take no account of defence improvements which are expected to take place in line with the flood risk management strategy for the Humber area. As such, tidal flood risk as a result of the Proposed Development to surrounding flood receptors (including infrastructure, residential and agricultural developments), which vary from water compatible to more vulnerable (Low to High Importance), is anticipated at this stage to be negligible to minor adverse. This results in a slight effect (**not significant**).

Flooding from Fluvial Sources during Operation

12.7.73. The FRA (**ES Volume II Appendix 12A (Application Document Ref. 6.3)**) indicates that the Site is at a 'low' risk of flooding, with the exception of the southern access route and construction laydown areas. There is a residual risk associated with breach of the defences on the River Trent however as fluvial water levels are lower than tidal water levels the assessed tidal risk is the worst-case with regards to overtopping and breach on the Trent and has been discussed above. In addition, a residual risk remains associated with failure of pumps (not related to Proposed Development) in the region.

12.7.74. All runoff from the Site is to discharge to Keadby Common Drain or the River Trent following SuDS attenuation and this discharge would be restricted to the greenfield runoff rate. In addition, any new or modified watercourse crossings will be designed to not increase fluvial flood risk. As such, the risk of fluvial flooding should not be significantly exacerbated by the Proposed Development's drainage design.

12.7.75. Fluvial flood risk to the Proposed Development, which is considered essential infrastructure of Very High Importance, will be mitigated through the design of the platform and drainage. As such, with the implementation of the drainage strategy and flood resilience measures, a negligible impact to the Proposed Development is anticipated at this stage, resulting in a slight effect (**not significant**). Other Essential Infrastructure within the area, including the existing Keadby and National Grid sites, are assumed to also be appropriately protected by flood resilience measures.

12.7.76. Fluvial flood risk as a result of the Proposed Development to surrounding flood receptors (including infrastructure, residential and agricultural developments), which vary from water compatible to more vulnerable (Low to High Importance), is anticipated at this stage to be negligible to minor adverse. This results in a neutral to slight effect (**not significant**). This preliminary assessment will be reviewed subject to the final Flood Risk Assessment.

Flooding from Surface Water Sources (Pluvial) during Operation

12.7.77. The risk of surface water flooding within the Site from elsewhere or generated within the Site is considered to be 'low', with some small and isolated patches of medium and high risk. Extensive drainage infrastructure already exists across the Site due to the Keadby 1 Power Station and Keadby 2 Power Station and the Proposed Development drainage would be kept separate from this.

12.7.78. Given the implementation of the drainage strategy, surface water from the Proposed Development will be carefully managed, treated and directed to Keadby Common Drain or the River Trent outfall at controlled greenfield runoff rates.

12.7.79. Pluvial flood risk to the Proposed Development, which is considered essential infrastructure of Very High Importance, will be mitigated through the drainage design. As such, with the implementation of the drainage strategy and flood resilience measures, a negligible impact to the Proposed Development is anticipated at this stage, resulting in a slight effect (**not significant**). Other Essential Infrastructure within the area, including the existing Keadby and National Grid Substation sites, are assumed to also be appropriately protected by flood resilience measures.

12.7.80. Pluvial flood risk as a result of the Proposed Development to surrounding flood receptors (including infrastructure, residential and agricultural developments), which vary from water compatible to more vulnerable (Low to High Importance), is anticipated at this stage to be negligible. The drainage design will prevent changes to off-site pluvial flood risk. This results in a neutral to slight effect (**not significant**). This preliminary assessment will be reviewed subject to the final Flood Risk Assessment.

Flooding from Groundwater Sources during Operation

12.7.81. The risk of groundwater flooding within the study area is considered to be 'low' within the FRA (**ES Volume II Appendix 12A (Application Document Ref. 6.3)**).

12.7.82. Should the Proposed Development comprise below ground development within strata where groundwater is recorded as present, mitigation measures, including those outlined in British Standard 8102 Code of Practice for Protection of Below Ground Structures Against Water From the Ground (BSI, 2022) will be required to reduce the risk of groundwater flooding to underground structures as is best practice.

12.7.83. Groundwater flood risk to the Proposed Development, which is considered essential infrastructure of Very High Importance, will be mitigated through the drainage design. As such, with the implementation of the drainage strategy and flood resilience measures, a negligible impact to the Proposed Development is anticipated at this stage, resulting in a slight effect (**not significant**). Other Essential Infrastructure within the area, including the existing Keadby and National Grid sites, are assumed to also be appropriately protected by flood resilience measures.

12.7.84. Groundwater flood risk as a result of the Proposed Development to surrounding flood receptors (including infrastructure, residential and agricultural developments), which vary from water compatible to more vulnerable (Low to High Importance), is anticipated at this stage to be negligible. This results in a neutral to slight effect (**not significant**). This preliminary assessment will be reviewed subject to the final Flood Risk Assessment.

Flooding from Artificial Sources during Operation

12.7.85. The Site is not considered at risk from reservoir flooding. The Stainforth and Keadby Canal is adjacent to the Site, but given the shallow gradients, and that it drains into the River Trent by a sluice, the risk of flooding is also likely to be low (see **ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3).** If any overtopping of the canal were to occur, this would drain into the North and South Soak drains located at a lower elevation on either side of the canal and drain away. However, the canal levels are monitored and maintained by the CRT. As a result, overtopping is unlikely and so the Site is at low risk of flooding from the canal.

12.7.86. Canal flood risk to the Proposed Development, which is considered essential infrastructure of Very High Importance, will be mitigated through the flood resilience measures and drainage design. As such, with the implementation of the drainage strategy and flood resilience measures, a negligible impact to the Proposed Development is anticipated at this stage, resulting in a slight effect (**not significant**). Other Essential Infrastructure within the area, including the existing Keadby and National Grid sites, are assumed to also be appropriately protected by flood resilience measures.

12.7.87. Canal flood risk as a result of the Proposed Development to surrounding flood receptors (including infrastructure, residential and agricultural developments), which vary from water compatible to more vulnerable (Low to High Importance), is anticipated at this stage to be negligible. This preliminary assessment will be reviewed subject to the final Flood Risk Assessment.

12.7.88. Following the completion of the Proposed Development, an additional residual risk relates to maintenance of the on-site drainage infrastructure. Failure, blockage and capacity exceedance above that of the design events for the drainage system are a potential risk to the Site and the surrounding area. In order to reduce the risks, an inspection and maintenance programme would be put in place for the drainage infrastructure to prevent/ minimise the residual risk of flooding from this source, should it occur.

12.7.89. CIRIA C753 (CIRIA, 2015) provides guidance on measures that can be incorporated into the detailed design of developments to steer surface water that has exceeded the capacity of the drainage system away from buildings and route it towards the intended point of attenuation and discharge (for example along swales and roads using raised kerbing and through parking areas). The proposed drainage infrastructure design will be agreed with the LLFA before construction to ensure that the risks of flooding from drainage infrastructure are not increased due to the Proposed Development.

12.7.90. Flood risk from drainage infrastructure to the Proposed Development, which is considered essential infrastructure of Very High Importance, will be mitigated through the drainage design. As such, with the implementation of the drainage strategy and flood resilience measures, a negligible impact to the Proposed Development is anticipated at this stage, resulting in a slight effect (**not significant**). Other Essential Infrastructure within the area, including the existing Keadby and National Grid sites, are assumed to also be appropriately protected by flood resilience measures.

12.7.91. Flood risk from drainage infrastructure as a result of the Proposed Development to surrounding flood receptors (including infrastructure, residential and agricultural developments), which vary from water compatible to more vulnerable (Low to High Importance), is anticipated at this stage to be negligible. This results in a neutral to slight effect (**not significant**). This preliminary assessment will be reviewed subject to the final Flood Risk Assessment.

Decommissioning Phase

12.7.92. At the end of its operating life, all above-ground equipment associated with the Proposed Development would be decommissioned and removed from the Site. It is assumed that all underground infrastructure will remain in-situ, however, all connection and access points will be sealed or grouted to ensure disconnection.

12.7.93. On this basis, decommissioning impacts are expected to be limited to waterbodies in close proximity to the Site (i.e. River Trent, Stainforth and Keadby Canal, Keadby Common Drain, North Soak Drain and Drains D1, D2, D5 and D6), and will be similar to the impacts reported for the construction phase, but with fewer earthworks, excavations and tunnel arisings to manage.

12.7.94. A detailed Decommissioning Environmental Management Plan will be prepared in accordance with the Requirements of the **Draft DCO**

(Application Document Ref. 3.1) to identify required measures to prevent pollution during this phase of the development, based on the detailed decommissioning plan.

12.7.95. There may be marginal improvements to the water quality of the River Trent, Stainforth and Keadby Canal or Drain 1 waterbodies following decommissioning of the Proposed Development given that the proposed abstraction/ discharges will be ceasing. However, any such change will be negligible given that no significant adverse effects have been identified. For the very high importance River Trent this negligible impact is a slight beneficial effect (**not significant**). For the high importance Stainforth and Keadby Canal and medium importance Drain 1 this also gives a slight beneficial effect (**not significant**).

12.8. Mitigation, Monitoring and Enhancement Measures

Mitigation Measures

12.8.1. Mitigation of adverse impacts on the water environment during the construction and operational phases will be achieved principally through embedded and essential measures identified in Section 12.6, notably the Site design, adoption of a final CEMP and WMP.

12.8.2. The Proposed Development is being designed to ensure the operation of the Site is maintained in the event of an extreme flood should the existing tidal defences fail in the vicinity of the Site, or in the event of heavy rainfall that could result in surface water flooding at the Site, should the design capacity of the drainage network be exceeded. The design and operational strategies include:

- providing flood resistance and resilience measures including raising of critical operational infrastructure;
- flood emergency response plans;
- flood warnings and alerts;
- emergency access and egress;
- place of safe refuge; and
- design capacity exceedance.

Monitoring Measures

12.8.3. A water quality monitoring programme is set out in the outline WMP included as an appendix in the **Outline CEMP** (**Application Document Ref. 7.4)**. This will need to be further developed by the principal contractor in consultation with the Environment Agency, the LLFA and/

or IDB, during the process of obtaining Environmental Permits/ Consents/ Licences for works affecting, or for temporary discharges to, waterbodies during the construction period.

12.8.4. The programme will be assumed to include a combination of daily observations and monitoring using a calibrated, handheld water quality probe through the upstream and downstream reaches of water features hydrologically-connected to the Site. It is expected that water quality sampling will be undertaken on a periodic as well as ad-hoc basis, dependent upon circumstances / activities on-site. Monitoring and sampling will be undertaken prior to the commencement of construction as to allow a sufficient baseline data.

12.8.5. It is assumed that the need for long term water quality monitoring will be set out and agreed with the Environment Agency through the environmental permitting process and thus no details of what this may involve are described here.

Enhancement Measures

12.8.6. An **Outline Landscape and Biodiversity Management and Enhancement Plan (LBMEP) Report** accompanies the DCO Application (**Application Document Ref. 5.10**). This sets out biodiversity enhancement proposals and the habitat management and monitoring proposed to deliver these..

12.8.7. It is proposed that submission and approval of the final LBMEP Report is secured by a Requirement in the **Draft DCO (Application Document Ref. 3.1)**.

12.9. Limitations and Difficulties

12.9.1. No water quality monitoring has been undertaken specifically to inform this assessment. This is not considered a limitation as background water quality data has been determined from the nearest data available of the Environment Agency's Water Quality Archive website (Environment Agency, 2024) and other assessments produced to inform the design of the Proposed Development (including preliminary water supply and wastewater discharge feasibility assessments).

12.9.2. This assessment has been undertaken using available data and Proposed Development design details at the time of writing in August 2025, unless specifically stated. However, at this stage some details of the Proposed Development remain uncertain or under development. The assumptions used are listed in Section 12.3 and have followed the

Rochdale Envelope approach (as outlined in Section 12.4). As such, the assessment is a worst-case scenario.

12.10. Summary of Likely Residual Effects

12.10.1. A summary of residual effects on water resources and flood risk and their significance is provided in Table 12.17.

Table 12.15: Summary of Residual Impacts and Effects

Description of Effect	Importance of Receptor (sensitivity for Flood Risk)	Magnitude of Impact	Initial Classification of Effect (with embedded and essential mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
Construction					
Surface Water Quality – suspended fine sediments	River Trent – Very High; Stainforth and Keadby Canal – High; North and South Soak Drain – High; Hatfield Waste Drain (and North Engine Drain) – High; Drain D1, D2, D6 – Medium;	River Trent – Negligible; Stainforth and Keadby Canal – Minor Adverse; North and South Soak Drain – Minor Adverse; Hatfield Waste Drain (and North Engine Drain) - Negligible	Slight Adverse (**not significant**) effects predicted for: River Trent Stainforth and Keadby Canal North and South Soak Drain Hatfield Waste Drain (and North Engine Drain) Drain D1, D2, D6	Further to the implementation of the final CEMP and WMP (essential mitigation), water quality monitoring pre-construction and during construction will be undertaken. Careful management of any required drilling techniques for pipeline installation across watercourses as far as reasonably practicable.	Slight Adverse (**not significant**) effects for: River Trent Stainforth and Keadby Canal North and South Soak Drain Hatfield Waste Drain (and North Engine Drain)

Description of Effect	Importance of Receptor (sensitivity for Flood Risk)	Magnitude of Impact	Initial Classification of Effect (with embedded and essential mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
	Drains D10 to D13 and unnamed drains – Low.	Drains D1, D2, D5, D6, D10 to D13 and unnamed drains – Minor Adverse.	Neutral (**not significant**) effect for Drains D10 to D13 and unnamed drains		Drain D1, D2, D6 Neutral (**not significant**) effects for Drains D5, D10 to D13 and unnamed drains
Surface Water and Groundwater Quality – chemical spillages	River Trent – Very High; Stainforth and Keadby Canal – High;	River Trent – Negligible; Stainforth and Keadby Canal – Negligible; North and South Soak	Slight Adverse (**not significant**) effects predicted for: River Trent Stainforth and Keadby Canal	Further to the implementation of the final CEMP and WMP (essential mitigation), water quality monitoring pre-construction and during construction will be undertaken.	Slight Adverse (**not significant**) effects for: River Trent Stainforth and Keadby Canal

Description of Effect	Importance of Receptor (sensitivity for Flood Risk)	Magnitude of Impact	Initial Classification of Effect (with embedded and essential mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
	North and South Soak Drain – High; Hatfield Waste Drain (and North Engine Drain) – High; Drain D1, D2, D6 – Medium; Drains D10 to D13 and unnamed drains – Low. Mercia Mudstone Bedrock (Secondary B aquifer) – Medium Warp and Alluvium	Drain – Negligible; Hatfield Waste Drain (and North Engine Drain) – Negligible Drain D1 - Negligible Drains D2, D6, D10 to D13 and unnamed drains – Minor adverse. Mercia Mudstone – Negligible	North and South Soak Drain Hatfield Waste Drain (and North Engine Drain) Drain D2 & D6 Mercia Mudstone Warp and Alluvium Neutral (**not significant**) effects for: Drains D1, D10 to D13 and unnamed drains		North and South Soak Drain Hatfield Waste Drain (and North Engine Drain) Drain D2 & D6 Mercia Mudstone Warp and Alluvium Neutral (**not significant**) effects for: Drains D1, D10 to D13 and

Description of Effect	Importance of Receptor (sensitivity for Flood Risk)	Magnitude of Impact	Initial Classification of Effect (with embedded and essential mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
	Superficial Deposits (Secondary A aquifer)- High	Warp and Alluvium - Negligible			unnamed drains.
Morphological effects relating to installation of a cofferdam at the abstraction point	Stainforth and Keadby Canal – Low (for morphology).	Stainforth and Keadby Canal – Minor adverse.	Slight Adverse (**not significant**) effects for: Stainforth and Keadby Canal	Monitoring, as required, during cofferdam works.	Slight Adverse (**not significant**) effects for: Stainforth and Keadby Canal
Morphological Effects to Waterbodies: New Bridges and Crossings for the Connection	Hatfield Waste Drain - Low Drains D1, D6, D10 to D13	Hatfield Waste Drain – Negligible ; D1 – Negligible;	Neutral (**not significant**) effects for: Hatfield Waste Drain, Drains D1, D6, D10 to D13	Further to the implementation of the final CEMP and WMP (essential mitigation), including works should be undertaken in drier periods of the year, as far as reasonably practicable; pump intakes should be	Neutral (**not significant**) effects for: Hatfield Waste Drain, Drains

Description of Effect	Importance of Receptor (sensitivity for Flood Risk)	Magnitude of Impact	Initial Classification of Effect (with embedded and essential mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
Corridors and Access	– Low (for morphology).	Drains D6, D10 to D13 - Negligible.		appropriately screened to prevent fish being drawn into the pipe/ pump; and drainage and planting to be reinstated following completion of works.	D1, D6, D10 to D13
Physical Effects to Waterbodies: Loss of Drain D4, Drain A and partial infilling of Drain D2	Drain D2 – Low (for morphology) Drain A - Low Drain D4 - Low	Drain D2 – moderate adverse Drain A – moderate adverse Drain D4 – moderate adverse	Slight adverse **(not significant)** for: Drain D2 Drain D4 Drain A	Ongoing engagement with IDB. Monitoring, as required, pre, during and post construction.	Slight adverse **(not significant)** for: Drain D2 Drain D4 Drain A
Navigation impacts during construction	River Trent – High (for navigation)	River Trent – minor adverse;	Slight adverse (**not significant**) effects for:	Ongoing pre-application engagement with ABP Humber to inform the final approach to marine works such that they	Slight adverse (**not**

Description of Effect	Importance of Receptor (sensitivity for Flood Risk)	Magnitude of Impact	Initial Classification of Effect (with embedded and essential mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
	Stainforth & Keadby Canal – High (for navigation)	Stainforth & Keadby Canal – minor adverse.	River Trent and Stainforth & Keadby Canal	have a minimal risk of disruption to the mariner; Ongoing engagement with the Canal and River Trust to help refine measures to ensure awareness of works among mariners.	**significant**) effects for: River Trent and Stainforth & Keadby Canal
Tidal and Fluvial Flood Risk to Proposed Development	Construction Workers – Very High	Negligible	Slight adverse (**not significant**)	None proposed (essential mitigation as per CEMP)	Slight adverse (**not significant**)
Pluvial Flood Risk to Proposed Development	Construction Workers – Very High	Negligible	Slight adverse (**not significant**)	None proposed (essential mitigation as per CEMP)	Slight adverse (**not significant**)
Groundwater Flood Risk to Proposed Development	Construction Workers – Very High	Negligible	Slight adverse (**not significant**)	None proposed (essential mitigation as per CEMP)	Slight adverse (**not significant**)

Description of Effect	Importance of Receptor (sensitivity for Flood Risk)	Magnitude of Impact	Initial Classification of Effect (with embedded and essential mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
Flood Risk to Proposed Development from artificial sources	Construction Workers – Very High	Negligible	Slight adverse (**not significant**)	None proposed (essential mitigation as per CEMP)	Slight adverse (**not significant**)
Operation					
Potential Pollution of Surface Watercourses: Routine Runoff and Accidental Spillages	Drain 1 - Medium Or River Trent – Very High	Drain 1 – Negligible Or River Trent - Negligible	Drain 1 - Neutral (**not significant**) Or River Trent – Slight adverse (**not significant**)	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Drain 1 - Neutral (**not significant**) Or River Trent – Slight adverse (**not significant**)

Description of Effect	Importance of Receptor (sensitivity for Flood Risk)	Magnitude of Impact	Initial Classification of Effect (with embedded and essential mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
Potential Impacts on water quality of the River Trent from operational discharges	River Trent -Very High	River Trent - Negligible	River Trent - Slight adverse (**not significant**)	Environmental Permit requirements and Implementation of Drainage Strategy during detailed design (embedded mitigation).	River Trent - Slight adverse (**not significant**)
Demand for Water Abstraction	Stainforth and Keadby Canal - High	Stainforth and Keadby Canal: Negligible.	Stainforth and Keadby Canal – Neutral (**not significant**).	Further engagement to be undertaken with Environment Agency and CRT	Stainforth and Keadby Canal – Neutral (**not significant**).
Foul Water Discharge	Unknown waterbody (depends on treatment works used)	Minor adverse	Neutral (**not significant**)	Consultation to be undertaken with Severn Trent Water, or EA if package treatment implemented.	Neutral (**not significant**)
Tidal Flood Risk to Proposed Development	Essential Infrastructure – Very High	Negligible	Slight Adverse (**not significant**)	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Slight Adverse (**not significant**)

Description of Effect	Importance of Receptor (sensitivity for Flood Risk)	Magnitude of Impact	Initial Classification of Effect (with embedded and essential mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
Tidal Flood Risk as a result of the Proposed Development	Various Flood Receptors (More vulnerable to water compatible developments) – Low to High	Negligible to Minor Adverse	Slight Adverse **(not significant)**	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Slight Adverse (**not significant**)
Fluvial Flood Risk to Proposed Development	Essential Infrastructure – Very High	Negligible	Slight Adverse (**not significant**)	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Slight Adverse (**not significant**)
Fluvial Flood Risk as a result of the Proposed Development	Various Flood Receptors (More vulnerable to water compatible developments) – Low to High	Negligible to Minor Adverse	Slight Adverse **(not significant)**	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Slight Adverse (**not significant**)

Description of Effect	Importance of Receptor (sensitivity for Flood Risk)	Magnitude of Impact	Initial Classification of Effect (with embedded and essential mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
Pluvial Flood Risk to Proposed Development	Essential Infrastructure – Very High	Negligible to Minor Adverse	Slight Adverse **(not significant)**	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Slight Adverse (**not significant**)
Pluvial Flood Risk as a result of the Proposed Development	Various Flood Receptors (More vulnerable to water compatible developments) – Low to High	Negligible	Neutral to Slight Adverse **(not significant)**	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Neutral to Slight Adverse **(not significant)**
Groundwater Flood Risk to Proposed Development	Essential Infrastructure – Very High	Negligible	Slight Adverse (**not significant**)	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Slight Adverse (**not significant**)
Groundwater Flood Risk as a result of the Proposed Development	Various Flood Receptors (More vulnerable to water compatible	Negligible	Neutral to Slight Adverse **(not significant)**	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Neutral to Slight Adverse **(not significant)**

Description of Effect	Importance of Receptor (sensitivity for Flood Risk)	Magnitude of Impact	Initial Classification of Effect (with embedded and essential mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
	developments) – Low to High				
Flood Risk to Proposed Development from drainage infrastructure and artificial waterbodies	Essential Infrastructure – Very High	Negligible	Slight Adverse (**not significant**)	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Slight Adverse (**not significant**)
Flood Risk as a result of Proposed Development from drainage infrastructure and artificial waterbodies	Various Flood Receptors (More vulnerable to water compatible developments) – Low to High	Negligible	Neutral to Slight Adverse **(not significant)**	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Neutral to Slight Adverse **(not significant)**

12.11. References

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