CONTENTS

TABLES

11.0 WATER RESOURCES, FLOOD RISK AND DRAINAGE

11.1 Introduction

11.1.1 This chapter of the Environmental Statement (ES) addresses the potential effects of the Proposed Development near Eggborough, North Yorkshire on water resources, flood risk and drainage. It identifies key water resources and sensitivities and highlights potential direct and indirect impacts on them from the Proposed Development.

11.1.2 This chapter is supported by Figure 11.1 provided in ES Volume II, and Appendix 11A (Flood Risk Assessment (FRA), including an Outline Drainage Strategy as Annex 5) provided in ES Volume III.

11.1.3 The FRA details the existing levels of flood risk associated with the Site and the surrounding area, considers the volume of surface water on the Site and requiring management, identifies the impacts the Proposed Development will have upon these aspects, and suggests potential mitigation measures to reduce the impact and manage the risk.

11.1.4 The Outline Drainage Strategy for the Proposed Development (see Appendix 11A in ES Volume III) provides guidance and information with regards to the effective and safe drainage of surface water for the Site. The final drainage design will be completed as part of the detailed design stage.

11.1.5 It should be noted that some of the potential impacts and effects relating to the hydrogeology underlying the Proposed Development are also addressed within Chapter 12: Geology, Hydrogeology and Land Contamination of this ES due to the considerable overlap between the two subject areas. Flood risk issues are also addressed in Chapter 18: Sustainability and Climate Change and Chapter 20: Cumulative and Combined Effects) and waterbodies (as ecological habitats) are considered in Chapter 10: Ecology and Nature Conservation.

11.2 Legislation and Planning Policy Context

European Legislation

11.2.1 The European Union (EU) Water Framework Directive (WFD) (2000/60/EC) (Commission of the European Communities, 2000) is the primary European Directive setting the context for the requirements of this chapter. The purpose of the Directive is to establish a framework for the protection and improvement of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater.

11.2.2 The Directive requires the UK to classify the current condition of key waterbodies (giving a 'Status' or 'Potential') and to set objectives to either maintain the condition, or improve it where a waterbody is failing minimum targets. Any activities or developments that could cause deterioration within a nearby waterbody, or prevent the future ability of a waterbody to reach its target Status, must be mitigated so as to reduce the potential for harm and allow the aims of the WFD to be realised.

National Legislation

11.2.3 The Water Resources Act 1991 (as amended) sets out the relevant regulatory controls that provide protection to waterbodies and water resources (from abstraction pressures and pollution).

11.2.4 Other relevant national legislation which set out requirements related to control and protection of water resources and flood risk management includes:

- The Flood and Water Management Act 2010 (FWMA) – see paragraphs 11.2.6 – 11.2.16 below;
- The Water Act 2003 and 2014 governing the control of water abstraction, discharge to water bodies, water impoundment, conservation and drought provision;
- The Environment Act 1995, which established the Environment Agency and its statutory role in water resource protection;
- The Environmental Protection Act 1990, which provides for integrated pollution control; and
- The Land Drainage Act (1991), which provides for drainage management related to non-main rivers.

11.2.5 A number of specific regulations have been enacted to implement the statutory European and national legislation into UK law. These regulations include:

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. These Regulations are important to the assessment within this chapter as they set the WFD environment quality standards that need to be met and maintained in UK waterbodies;
- The Anti-Pollution Works Regulations 1999;
- The Control of Pollution (Oil Storage) (England) Regulations 2001;
- The Groundwater Regulations (England and Wales) 2009;
- The Environmental Damage Regulations 2009;
- The Water Resources Act (Amendment) (England and Wales) Regulations 2009;
- The Environmental Permitting (England and Wales) Regulations 2010, which control discharge of water to surface water and groundwater; and
- The Water Supply (Water Quality) Regulations 2010.

11.2.6 The FWMA, enacted by Government in response to The Pitt Review in 2010 (Cabinet Office, 2008), designates county councils, such as North Yorkshire County Council (NYCC), as Lead Local Flood Authorities (LLFAs). As a LLFA, NYCC has responsibilities to lead and co-ordinate local flood risk management. Local flood risk is defined as the risk of flooding from surface water runoff, groundwater and ditches and watercourses (collectively known as ordinary watercourses).

11.2.7 Schedule 3 of the FWMA, which is yet to be fully commenced, deals with SuDS. In particular, the Act calls for the establishment of a SuDS Approving Body (SAB) to be set up within LLFAs. The responsibilities of the SAB can be delegated to other organisations, such as the local planning authority, but the legal responsibility for drainage matters remains with the LLFA.

11.2.8 The Act requires SAB approval of all new drainage systems for new and redeveloped sites and highways to be obtained before construction can commence. It also requires that the

proposed drainage system meets National Standards for Sustainable Drainage (Defra, 2011). These National Standards are concerned with the design, construction, operation and maintenance of SuDS. If the National Standards for SuDS are met, then the SAB will be required to adopt and maintain the approved SuDS that serve more than one property. SuDS in highways will be adopted by the highways authority.

11.2.9 The Act also amends Section 106 of Water Industry Act (1991) to make the right to connect surface water to public sewers conditional on the SAB approving the drainage system as meeting the National Standards.

11.2.10 The SuDS provisions in Schedule 3 of the Act make no changes to the right to connect foul water to the public sewer system.

11.2.11 The FWMA also formalises the flood risk management roles and responsibilities for other organisations including the Environment Agency, water companies and highways authorities establishing them as Risk Management Authorities (RMAs). The responsibility to lead and co-ordinate the management of tidal and fluvial flood risk remains that of the Environment Agency.

National Planning Policy

11.2.12 The Overarching National Policy Statement (NPS) for Energy (EN-1) Section 5.7 (Flood Risk) (Department for Energy and Climate Change, 2011a) details that projects of 1 hectare (ha) or greater in Flood Zone 1 in England and all proposals for energy projects located in Flood Zones 2 and 3 in England should be accompanied by a FRA.

11.2.13 The requirements for FRAs are that they should:

- be proportionate to the risk and appropriate to the scale, nature and location of the project;
- consider the risk of flooding arising from the project in addition to the risk of flooding to the project;
- take the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made;
- be undertaken by competent people, as early as possible in the process of preparing the proposal;
- consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood storage areas and other artificial features, together with the consequences of their failure;
- consider the vulnerability of those using the Site, including arrangements for safe access;
- consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;
- consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;
- include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular project;
- consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems;

- consider if there is a need to be safe and remain operational during a worst case flood event over the development's lifetime; and
- be supported by appropriate data and information, including historical information on previous events.

11.2.14 In determining an application for development consent, the Planning Inspectorate should be satisfied that where relevant:

- the application is supported by an appropriate FRA;
- the Sequential Test has been applied 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;
- priority has been given to the use of sustainable drainage systems (SuDs); and
- in flood risk areas the project is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed over the lifetime of the development.

11.2.15 Section 5.15 of NPS EN-1 details that where the project is likely to have effects on the water environment, the applicant for development consent should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent.

11.2.16 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 the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Catchment Abstraction Management Strategies);
- existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics; and
- any impacts of the proposed project on water bodies or protected areas under the Water Framework Directive and source protection zones (SPZs) around potable groundwater abstractions.

11.2.17 NPA EN-2 (Department for Energy and Climate Change, 2011b)) on Fossil Fuel Electricity Generating Infrastructure (NPS EN-2)) states that where a project is likely to have effects on water quality or resources the applicant for development consent should undertake an assessment which should particularly demonstrate that appropriate measures will be put in place to avoid or minimise adverse impacts of abstraction and discharge of cooling water. The applicant for development consent should demonstrate measures to minimise adverse impacts on water quality and resources.

11.2.18 The National Planning Policy Framework (NPPF) (DCLG, 2012) outlines the Government's economic, environmental and social planning policies for England. The NPPF supersedes and replaces a number of planning policy documents that are applicable to the water environment including Planning Policy Statement 25 (PPS25): Development and Flood Risk (DCLG, 2010) and PPS23: Planning and Pollution Control (DCLG, 2004).

11.2.19 The NPPF sets out 12 planning principles as guidance for local councils for the creation of their local plan; the following principle is directly applicable to flood risk:

> *"10. Meeting the challenge of climate change, flooding and coastal change – support the transition to a low carbon future in a changing climate taking full account of (inter alia) flood risk and coastal change."*

11.2.20 On 6th March 2014 the National Planning Practice Guidance (NPPG) web-based resource was launched (DCLG, 2014), which includes greater emphasis on issuing more robust guidance with regards to flood risk. The purpose of the new online national planning guidance is to give simplicity and clarity to the planning system.

11.2.21 The NPPG contains guidance in relation to water supply, wastewater and water quality, and flood risk management. It also provides advice and information on how planning can and should protect water quality; ensure the delivery of adequate water and wastewater infrastructure for new development and ensure development is protected from flood risk, and does not increase flood risk elsewhere.

11.2.22 The Non-statutory Technical Standards for Sustainable Drainage Systems (Defra, 2015) was published in March 2015 and is the current guidance for the design, maintenance and operation of Sustainable Drainage Systems (SuDS). The standards set out 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.

11.2.23 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.

11.2.24 It is also noted within the standards that pumping should only be used when it is not reasonably practicable to discharge by gravity.

11.2.25 The East Inshore and East Offshore Marine Plans (Marine Management Organisation, 2014) are guidance documents for developers to ensure the sustainable development of the marine area and protection of the marine ecosystem. These plans have been published in line with the Marine Policy Statement (Defra, 2011) and NPPF.

11.2.26 The East Inshore Marine Plan area includes the coastline stretching from Flamborough Head to Felixstowe, extending out to the seaward limit of the territorial sea (approximately 12 nautical miles), and the waters of any estuary, river or channel, so far as the mean high water spring tidal limit. This includes the tidal limits for the Humber Estuary, which incorporates areas of Selby District. The Proposed Gas Connection and the Proposed Cooling Water Connection (discharge point) are located within the tidal reach of the River Aire. The tidal extent of the River Aire is located at Chapel Haddlesey weir (as shown in Figure 11.1 (ES Volume II)).

Local Planning Policy

11.2.27 The Site lies entirely within the administrative areas of Selby District Council (SDC) and NYCC. The local development plan for the area comprises the following documents:

- the 'saved' policies of the North Yorkshire Waste Local Plan (NYCC, 2006) – adopted 2006- these mostly relate to waste management facilities and are not relevant to the Proposed Development;
- the 'saved' policies of the North Yorkshire Minerals Local Plan (NYCC, 1997) – adopted 1997 – not relevant to the Proposed Development; and
- the Selby District Core Strategy Local Plan (Selby District Council, 2013) – adopted October 2013.

11.2.28 In addition to the local development plan, SDC and NYCC are currently in the early preparation stages of the following emerging documents:

- SDC is preparing a 'Sites and Policies Local Plan' to deliver the strategic vision outlined in the Core Strategy, which is due to be subject to further consultation in 2017 and which is ultimately intended to supersede the remaining saved policies in the Selby District Local Plan; and
- NYCC is currently preparing a Joint Minerals and Waste Plan which is understood to shortly be subject to examination, with a view to adoption in November 2017.

11.2.29 The majority of the 'saved' policies of the North Yorkshire Waste Local Plan relate to waste management facilities (defined in the Plan as "Facilities associated with the processing and disposals of waste materials") and are not therefore considered relevant to the Proposed Development as it is not a waste management proposal.

11.2.30 None of the 'Saved' policies contained in the North Yorkshire Minerals Local Plan are considered to be of relevance to the Proposed Development.

11.2.31 The SDC Local Plan Core Strategy was adopted on 22nd October 2013. It forms the statutory guidance for land use and planning and defines the spatial vision for Selby and the surrounding area for the period to 2027.

11.2.32 Policy SP15 states that SDC will "*Ensure that development in areas of flood risk is avoided wherever possible through the application of the sequential test and exception test; and ensure that where development must be located within areas of flood risk that it can be made safe without increasing flood risk*".

11.2.33 The policy also states that development should support sustainable flood management measures such as water storage areas and schemes promoted through local surface water management plans to provide protection from flooding; and biodiversity and amenity improvements. Developments should also incorporate water-efficient design and sustainable drainage systems which promote groundwater recharge.

North Yorkshire County Council SuDS Design Guidance

11.2.34 The NYCC SuDS design guidance note (NYCC, 2016) aims to provide direction to relevant design guidance for the successful implementation of SuDS and is the basis against which planning consultations from Local Planning Authorities will be assessed. It outlines the key design

principles, different SuDS components, construction and maintenance methods, and lists the key information required by NYCC for planning applications.

Internal Drainage Board (IDB) Byelaws

11.2.35 The IDBs are responsible for managing water levels in the watercourses designated to each IDB and work in partnership with other authorities to actively manage and reduce the risk of flooding within the Board's district. They have permissive powers under the Land Drainage Act 1991 (as amended by the 1994 Act) to undertake maintenance on any watercourse within their district other than 'Main Rivers' and to supervise all matters relating to the drainage of land within their districts. Permissive powers means that the IDBs are permitted to undertake works on ordinary watercourses but the responsibility remains with the riparian owner[1] as the IDBs are not obligated. IDBs can undertake works on watercourses outside their drainage district in order to benefit the district. IDBs may make byelaws, approved by the relevant Minister, for securing the efficient working of the drainage systems.

11.2.36 There are two IDBs operating in the flood risk study area for the Proposed Development: the Selby Area IDB (land to the north of the River Aire, including the Proposed Gas Connection corridor) and the Danvm Drainage Commissioners (land to the south of the River Aire including the existing Eggborough Power Station site).

11.2.37 Any developer working in an IDB area should review the following byelaws (Defra, 2012):

- Byelaw 3: Control of introduction of water and increase in flow or volume of water;
- Byelaw 4: Control of sluices etc;
- Byelaw 6: Diversion or stopping up of watercourses;
- Byelaw 10: No obstructions within 9 metres (7 metres for the Selby Area IDB) of the edge of the watercourse;
- Byelaw 17: Fences, excavations, pipes etc.; and
- Byelaw 18: Interference with Sluices.

Other Guidance

Environment Agency Pollution Prevention Guidance Notes

11.2.38 The Environment Agency Pollution Prevention Guidance (PPG) Notes provide advice on statutory responsibilities and good environmental practice. Although the PPGNs have been revoked they still provide relevant guidance. The Guidance Notes of particular relevance to the Proposed Development include:

- PPG 1 – General Guide to the Prevention of Pollution (EA, 2000a), provides an introduction to the prevention of pollution from a variety of sources;

[1] The responsibility for managing and maintaining ordinary watercourses falls to riparian owners who typically own land on either bank and therefore are deemed to own the land to the centre of the watercourse. NYCC, as the LLFA, has permissive powers to manage the risk of flooding arising from the watercourses through engagement with riparian owners and enforcing maintenance responsibilities in accordance with the Land Drainage Act 1991, http://www.legislation.gov.uk/ukpga/1991/59/contents

- PPG2 – Above Ground Oil Storage Tanks (EA, 2010a) offers advice on storage options, equipment and its maintenance and how to deal with spills;
- PPG3 – Use and Design of Oil Separators in Surface Water Drainage Systems (EA, 2007a), provides guidance on when oil separators are appropriate and what size and type of separator are required;
- PPG4 – Disposal of Sewage Where No Mains Drainage is Available (EA, 2006), offers advice if connection to the local sewage network is not possible and offers guidance on alternative means of wastewater disposal;
- PPG5 – Works In, Near To, or Liable To Affect Watercourses (EA, 2007b) provides guidance on general precautions to take when working in the vicinity of, or immediately upstream of the site, to as far downstream as a potential impact may influence the quality or quantity of the watercourse;
- PPG6 – Working at Construction or Demolition Sites (EA, 2010b) repeats much of what PPG5 presents but concentrates specifically on the situations likely to occur at demolition and construction sites;
- PPG7 – Refuelling Activities (EA, 2004a), provides information on the correct delivery, storage and dispensing of fuel to help reduce the risk (EA, 2004b);
- PPG 13 – Vehicle Washing and Cleaning (EA, 2007c);
- PPG 18 – Managing Fire Water and Major Spillages (EA, 2000b); and
- PPG 21 – Pollution Incident Response Planning (EA, 2009a), contains advice for those developing site specific pollution incident response plans to help prevent and mitigate damage to the environment caused by accidents such as spillage and fire.

Construction Industry Research and Information Association (CIRIA) Guidance

11.2.39 The CIRIA guidance of relevance to the Proposed Development includes:

- Guidance C532 - Control of Water Pollution from Construction Sites (CIRIA, 2001) brings together the Environment Agency guidance but goes into greater detail with regard to sources of water on construction sites, pollutants and pathways. In addition, it provides guidance on planning for the type and location of suitable control measures; and
- Guidance C753 - The SuDS Manual (CIRIA, 2015) provides best practice guidance on the planning, design, construction, operation and maintenance of SuDS to facilitate their effective implementation within developments.

11.3 Assessment Methodology and Significance Criteria

Impact Assessment and Significance Criteria

11.3.1 There is no standard methodology for assessing the magnitude of impacts and significance of effects of proposed developments on the water environment. Each project is evaluated according to its individual characteristics. A methodology for assessing the significance of any effect has therefore been developed for projects throughout the UK, based on relevant legislation.

11.3.2 The assessment criteria used in this chapter are based on the web-based DETR (Department of the Environment, Transport and the Regions) document 'Transport Analysis Guidance' (known as WebTAG) Unit 3.3.11 (DfT, 2003). This methodology provides an appraisal framework for taking the outputs of the environmental impact process and analysing the key information of relevance to the water environment. Although this guidance is intended for transport studies,

it is commonly used for water resources impact assessment for other types of infrastructure, and is considered suitable for application to other development schemes in the absence of other suitable guidance.

11.3.3 For the purpose of this assessment, a number of modifications to the WebTAG criteria have been made to address relevant legislation (notably the WFD). These modifications are based on other more recent guidance, where appropriate, e.g. The Design Manual for Roads and Bridges (DMRB) (Highways Agency, 2009) and professional judgement.

11.3.4 The WebTAG methodology takes into account the importance and magnitude of predicted impacts on the water environment. Importance is based on the value of the feature or resource (see Table 11.1), while the magnitude of a potential impact is estimated based on the degree of impact and is independent of the importance of the feature (see Table 11.2).

11.3.5 The basic approach to assessing the impacts of the Proposed Development on water receptors is to consider how sensitive the receptors may be to changes in surface water or groundwater conditions, including flows and water quality. The indicators used in making a professional judgement on the importance of a water feature under consideration include quality, scale, rarity and substitutability where:

- quality is a measure of the physical condition of the attribute;
- scale requires consideration of the geographical scale at which the attribute matters to both policy makers and stakeholders, at all levels;
- rarity requires consideration of whether the water feature is commonplace or scarce, at the scale at which it matters; and
- substitutability requires consideration of whether water attributes are replaceable over a given time frame.

Table 11.1: Importance of water feature or resource (modified from WebTAG Unit 3.3.11)

Importance	Criteria	Examples
Very high	Attribute with a high quality and rarity, regional or national scale and limited potential for substitution	**Water resources**: Watercourse having a WFD classification as shown in a River Basin Management Plan (RBMP) and Q95 ≥ 1.0 m^3/s; Source Protection Zone (SPZ) 1 within a Principal Aquifer. **Water abstraction**: >1,000 m^3/day **Receptors to flood risk**: essential infrastructure or highly vulnerable development*
High	Attribute with a high quality and rarity, local scale and limited potential for substitution or attribute with a medium quality and rarity,	**Water resources**: Watercourse having a WFD classification as shown in a RBMP, and Q95 < 1.0 m^3/s; Principal Aquifer (not within SPZ

Importance	Criteria	Examples
	regional or national scale and limited potential for substitution.	1). [Cyprinid or Salmonid fishery] **Water abstraction**: 500-1,000 m^3/day **Receptors to flood risk**: more vulnerable development*
Medium	Attribute with a medium quality and rarity, local scale and limited potential for substitution or attribute with a low quality and rarity, regional or national scale and limited potential for substitution	**Water resources**: Watercourse detailed in the Digital River Network** but not having a WFD classification as shown in a RBMP; Secondary Aquifer. **Water abstraction**: 50-499 m^3/day **Receptors to flood risk**: less vulnerable development*
Low	Attribute with a low quality and rarity, local scale and limited potential for substitution	**Water resources**: Surface water sewer, agricultural drainage ditch; non-aquifer. **Water abstraction**: <50 m^3/day **Receptors to flood risk**: water compatible development *

* As defined in Table 2 of the Flood Risk section of the PPG (Department for Communities and Local Government, 2014)
** Digital River Network is a dataset that comprises river centrelines which has been digitised from OS 1:50,000 mapping. It consists of rivers; canals; surface pipes (man-made channels for transporting water such as aqueducts and leats); and miscellaneous channels (including estuary and lake centrelines and some underground channels).

11.3.6 Impacts may be adverse or beneficial, depending on the circumstances. Impacts are quantified where practicable and the degree or magnitude of impact is assessed on a qualitative scale, to facilitate comparison with impacts on other environmental receptors. This is further described in Table 11.3.

11.3.7 For an impact on water quality to exist, it is necessary for a pollution linkage to be identified whereby a source of pollution, a sensitive receptor to that pollution and a pathway by which the two are linked is demonstrated to exist (Source-Pathway-Receptor model). This model identifies the potential sources or 'causes' of impact as well as the receptors (water resources) that could potentially be affected. However, the presence of a potential impact source and a potential receptor does not always infer an impact, as there needs to be a clear mechanism or 'pathway' via which the source can have an effect on the receptor. For example, sewer flooding does not necessarily increase the risk of flooding unless the sewer is local to the Site and ground levels encourage surcharged water to accumulate.

11.3.8 The first stage in applying the Source-Pathway-Receptor model is to identify the causes or 'sources' of potential impact from a development. The impact 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. This has been

undertaken in the context of local conditions relative to water resources near the application site, such as topography, geology, climatic conditions and potential sources of contamination.

11.3.9 The next step in the model is to undertake a review of the potential receptors, that is, the water resources themselves that have the potential to be affected. The identification of potential water resource receptors has been undertaken through:

- a review of baseline data in consultation with the Environment Agency; and
- a walkover survey of the Site.

11.3.10 The last stage of the model is therefore to determine if there is a viable exposure pathway or a 'mechanism' linking the source to the receptor. The identification of sources and receptors is set out in the baseline section below and pathways are identified in the impact and effect section which highlights potential pathways that may lead to an impact on water quality.

Table 11.2: Magnitude of potential impacts

Magnitude	Impact	Description
High	Adverse: loss of an attribute and/or quality and integrity of an attribute	Decrease in surface water ecological or chemical WFD status or groundwater qualitative or quantitative WFD status. Change in flood risk to receptor from low or medium to high risk.
	Beneficial: creation of new attribute or major improvement in quality of an attribute	Increase in productivity or size of fishery; increase in surface water ecological or chemical WFD status; increase in groundwater quantitative or qualitative WFD status. Change in flood risk to receptor from high to low.
Medium	Adverse: loss of part of an attribute or decrease in integrity of an attribute	Measurable decrease in surface water ecological or chemical quality, or flow; reversible change in the yield or quality of an aquifer; such that existing users are affected, but not changing any WFD status. Change in flood risk to receptor from low to medium.
	Beneficial: moderate improvement in quality of an attribute	Measurable increase in surface water quality or in the yield or quality of aquifer benefiting existing users but not changing any WFD status. Change in flood risk to receptor from medium to low.
Low	Adverse: some measurable change to the integrity of an attribute	Measurable decrease in surface water ecological or chemical quality, or flow; decrease in yield or quality of aquifer; not affecting existing users or changing any WFD status. Change in flood risk to receptor from no risk to low risk.
	Beneficial: measurable increase, or reduced risk of	Measurable increase in surface water ecological or chemical quality; increase in yield or quality of aquifer not affecting

Magnitude	Impact	Description
	negative effect to an attribute	existing users or changing any WFD status. Change in flood risk to receptor from low risk to no risk.
Very low	No change to integrity of attribute	Negligible change discharges to watercourse or changes to an aquifer which lead to no change in the attribute's integrity.

11.3.11 Potential effects are classified by considering both the importance of the feature and the magnitude of the impact, using the matrix illustrated in Table 11.3.

Table 11.3: Classification of effects

Magnitude of impact	Sensitivity/ importance of receptor			
	Very high	High	Medium	Low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very low	Minor	Negligible	Negligible	Negligible

11.3.12 This chapter considers that major or moderate effects are significant for the purposes of the EIA Regulations, in accordance with standard EIA practice.

Key Parameters for Assessment

11.3.13 The Rochdale Envelope design parameters (i.e. the maximum parameters for the Proposed Development and in particular its main buildings and structures) outlined in Chapter 4: The Proposed Development do not affect the input parameters utilised in either the operational or construction assessments presented in this chapter, and consequentially the outcome of these assessments will not vary. The assessment adopts conservative (worst case) values where assumptions are necessary.

11.3.14 The FRA (Appendix 11A ES Volume III) considers the maximum building dimensions shown in the indicative layouts (Figure 4.1a and 4.1b) to determine the anticipated surface water runoff from the Site.

Extent of Study Area

11.3.15 This assessment considers water bodies that are hydrologically connected with the Site, based on available data. The water bodies included within the Study Area (as shown in Figure 11.1 (ES Volume II)) are set out below.

11.3.16 The main watercourses in the vicinity of the proposed Site are the River Aire, Ings and Tetherings Drain and Hensall Dyke. In addition, minor watercourses and other surface water features have also been identified to have hydrological connectivity with the Proposed Development. The assessment will consider these waterbodies within an area spanning from

immediately upstream of the Site, to as far downstream as a potential impact may influence the quality or quantity of the waterbody.

11.3.17 Six further ponds/ standing water bodies are visible on OS maps/ aerial imagery within the Study Area (a 250 m radius of the Site).

11.3.18 The Site is located within a groundwater Total Catchment (Zone 3) Source Protection Zone (SPZ), and bedrock beneath the Site is designated as a Principal Aquifer. The study area for consideration of potential impacts on groundwater is larger than the surface water study area, in order to consider potential impacts on the Aquifer.

11.3.19 Many of the issues relating to the hydrogeology underlying the Site are also dealt with in Chapter 12: Geology, Hydrogeology and Land Contamination. This is due to the considerable overlap between the two subject areas.

Sources of Information/Data

11.3.20 In order to identify and characterise the surface water and groundwater receptors considered as part of this assessment, available data on surface water and groundwater quality and quantity within the vicinity of the Site have been obtained. A number of sources of information and websites have been consulted, including:

- Ordnance Survey maps;
- Multi-Agency Geographical Information for the Countryside (MAGIC) website (MAGIC, 2016);
- Environment Agency website (EA, 2016);
- the Humber River Basin Management Plan (RBMP) (EA, 2009b);
- Groundsure Report (see Appendix 12B in ES Volume III);
- the Environment Agency was consulted and provided data on water, uses of groundwater, surface water features (potable water sources, fisheries, consented discharges etc.), groundwater quality and RBMP status and objectives;
- SDC Strategic Flood Risk Assessment (SFRA) (AECOM, 2016a);
- NYCC Preliminary Flood Risk Assessment (PFRA) (Jacobs, 2011); and
- a walkover of the study area by ecologists (undertaken in June 2016) to identify, locate and describe water resource receptors.

Consultation

11.3.21 A summary of consultation undertaken relevant to this Chapter is given in Table 11.4.

Table 11.4: Consultation summary table

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
Secretary of State	September 2016 (Scoping Opinion)	A Flood Risk Assessment (FRA) should be prepared as a standalone document to be appended or otherwise cross referred as part of the ES, but	A standalone FRA has been prepared and is presented in Appendix 11A. Flood risk is summarised

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
		that the ES chapter itself will also include an assessment of the environmental effects of the proposed development in terms of susceptibility to flooding and the potential for the proposed development to increase flood risk off site.	within this Chapter.
		The water resources and flood risk chapter of the ES (and the FRA) should fully consider the impacts associated with the chosen crossing methods as well as any culverts or diversion to watercourses that may be required.	The impacts associated with watercourse crossings are assessed in this Chapter. There are no anticipated culverts/ diversions required.
		In terms of both abstraction and discharge, there will need to be a clear description and assessment within the ES as to the reliance on existing infrastructure, quantities and licenses versus how these will vary in the context of the proposed development.	See Chapter 4: The Proposed Development
		Cross reference should be made between the assessment of water resources and ecology, particularly in the context of inter-related effects.	Chapter 10: Ecology and Nature Conservation has been cross-referenced, where required, to inform this assessment, as has Chapter 12: Geology, Hydrogeology and Land Contamination.
		It is expected that a description of the proposed drainage design (incorporating sustainable drainage techniques) including any land take and attenuation features that may be required.	An outline drainage strategy for the Site is included in Appendix 11A (ES Volume III)
		Reference should be made to	The Assessment

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
		the use of any established methods or guidance in terms of the impact assessment itself including reference to significance criteria. Where professional judgement is to be used, this should be clearly described and fully justified, particularly where there is any deviation from established guidance.	Methodology and Significance Criteria is presented in Section 11.3 of this Chapter.
		The DCO application should be accompanied by a WFD assessment.	The impact of the proposed development in terms of the WFD is included as part of this assessment.
Canals and Rivers Trust	16th September 2016 (e-mail to Planning Inspectorate)	Recommend that the ES provides more information on the proposed changes to the abstraction and discharge rates associated with the new power station for us to fully understand any impacts the scheme may have on the river.	See Chapter 4: The Proposed Development, which states that the cooling water abstraction volume will be less than half of that required for the existing coal-fired power station.
	16th February 2017 (formal consultation response on PEI Report)	We note that alterations to the existing abstraction arrangements at the River Aire are proposed which are likely to reduce abstraction rates, and look forward to working with you on the details to ensure that there will be no harm to the water quality, quantity, flow or navigational safety in this part of our network, or any effects on the wider network. Particularly we consider it essential that the characteristics of such discharges, including the flow levels and the maximum discharge temperatures, are made a condition of any DCO.	The impact of the proposed development on the attributes of identified water receptors with direct/ indirect hydrological pathways from the proposed development is considered in Section 11.6. General information with regards alterations to the existing abstraction infrastructure is included in Chapter 5: Construction Programme and Management.

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
		We understand that the discharge from the power station is proposed downstream from the Trust's navigation limits and, therefore, the Trust is unlikely to be directly affected by them. We would, however, be grateful for your reassurance in this regard.	The cooling water discharge from the power station will continue to utilise the existing power station cooling water discharge point which is located downstream from the Trust's navigation limits.
Environment Agency	16th September 2016 (letter to Planning Inspectorate)	A WFD assessment should show how the application meets RBMP requirements. As a minimum, an assessment should include: • The risk of deterioration - a proposed development must not cause any water body quality element to deteriorate to a lower status class. • Support for measures to achieve good status (or potential) - a proposed development must not prevent implementation of a measure in the RBMP to improve a surface water body or groundwater unless the applicant proposes an acceptable alternative to meet RBMP requirements. • The risk of harming any protected area - a proposed development must not harm a protected area in a RBMP.	The impact of the proposed development in terms of the WFD is included as part of this assessment.
	20th September 2016 (data request letter via email).	The Environment Agency provided Product 4 and Product 6 flood risk data and information with regards groundwater/ surface water abstractions/ discharges.	Data provided by the Environment Agency have been used to inform this assessment and the FRA.
	17th February	Water Quality/Water	The construction works in the

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
	2017 (formal consultation response on PEI Report)	Framework Directive (WFD). We broadly agree with the conclusion made throughout Section 11 that water quality and WFD will at most experience a 'minor adverse impact'. However, the environmental risks of silt pollution are inadequately addressed and insufficient mitigation has been proposed. Specifically, Table 10.5 (Chapter 10 Ecology) states that 'works associated with construction of the Proposed Cooling Water Connections will impact on the river and its banks. This may result in unavoidable release of sediments into the river'. The release of sediment risks polluting the river, thereby affecting water quality, the wider ecology as well as its WFD classification. Appropriate silt control measures should be used to prevent sediment input and pollution. For clarity, details of the measures which will be taken to control silt pollution will need to be implemented at the River Aire's cooling water connections, the Ings and Tethering Drain and Hensall Dyke.	River Aire associated with alterations to the proposed cooling water abstraction and discharge points are described in Chapter 5: Construction Programme and Management. The potential effects of the proposed temporary cofferdams in terms of water quality and WFD classification are assessed within this chapter, whilst the effects on wider ecology are assessed in Chapter 10: Ecology and Nature Conservation. Appropriate impact avoidance measures are included within Section 11.5 (and Section 10.5 of Chapter 10: Ecology and Nature Conservation).
North Yorkshire County Council	17th February 2017 (formal consultation response on PEI Report)	Having reviewed the relevant documents including the flood risk assessment I confirm that we have no objection to the proposed outline drainage strategy.	Comment noted.
Selby Internal Drainage	15th November	A response from Selby Internal Drainage Board has	n/a

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
Board (IDB)	2016 (letter via email)	yet to be received.	
Danvm Drainage Commissioners (IDB)	4th January 2017 (response to data consultation request – letter via email)	Danvm Drainage Commissioners confirmed there are no current nearby abstractions or discharges close to the Site and no known pollution events. There have been no historical flood events from their assets in this area or known surface water flooding problems. The IDB as a consultee gives the following comments/ recommendations: • our current guidelines for any increase in surface water discharge are as follows: – if the surface water were to be disposed of via a soakaway system, the IDB would have no objection in principle but would advise that the ground conditions in this area may not be suitable for soakaway drainage. It is therefore essential that percolation tests are undertaken to establish if the ground conditions are suitable for soakaway drainage throughout the year. – if surface water is to be directed to a mains sewer system the IDB would again have no objection in principle, providing that the Water Authority are	Data provided by the Danvm Drainage Commissioners have been used to inform this assessment and the FRA. Comments/ recommendations with regards surface water management have been used to inform the outline drainage strategy included in the supporting FRA (Appendix 11A, Annex 5).

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
		satisfied that the existing system will accept this additional flow. – if the surface water is to be discharged to any watercourse within the Drainage District, Consent from the IDB would be required in addition to Planning Permission, and would be restricted to 1.4 litres per second per hectare or greenfield runoff. • no obstructions within 7 metres of the edge of a watercourse are permitted without Consent from the IDB. Advice/recommendations: Should Consent be required from the IDB as described above then we would advise that this should be made a condition of any Planning decision.	
	7th March 2017 (meeting)	The following key points were noted from the meeting: • The Eggborough Power Station site falls within the Hensall Pumping Station catchment. The pumping station (located at the confluence of Ings and Tetherings Drain and the River Aire) was commissioned in 1965 and designed to accommodate an average runoff rate from the catchment area of 1.4 l/s/ha. The capacity of the pump is currently 3.3	The required information on existing and proposed drainage catchments and runoff rates was provided to the IDB on 8th March 2017 and the modelling outputs are awaited.

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
		cubic metres per second • Danvm Drainage Commissioners has recently commissioned a hydraulic model of the catchment, but this is not yet available to third parties. • Danvm Drainage Commissioners decide which ordinary watercourses within the catchment they will maintain, but responsibility for the ordinary watercourses ultimately lies with the riparian owners (generally landowners). • Applications can be submitted to Danvm Drainage Commissioners for Section 23 and Section 66 consents under the Land Drainage Act, for works in ordinary watercourses and works within 9m of ordinary watercourses respectively. Consents would include an agreed discharge volume limit and discharge location. Any water quality limits would be imposed by the Environment Agency. • EPL can request information on the predicted (hydraulic modelled) flood risk/land drainage impacts of a proposed new discharge to an ordinary watercourse within the catchment by providing information on the existing and proposed drainage catchment areas and runoff rate. This will inform the 'in principle' agreement between EPL	

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
		and Danvm Drainage Commissioners regarding discharge of surface water runoff from the power station site. • Following the conclusion of this exercise, a draft Statement of Common Ground is to be discussed and agreed between EPL and Danvm Drainage Commissioners.	
	5th and 12th May 2017 (emails)	The impact of the proposed surface water discharge (41 ha at 1.4 l/s) on the Hensall catchment has been considered using hydraulic modelling. The modelling demonstrates that: • the additional discharge causes some increase in maximum water level in the drains from the point of discharge through to Hensall pumping station; • in all of the events modelled there is negligible increase in flooded area at any location across the Hensall catchment Given the evidence-based hydraulic assessment results below, Danvm Drainage Commissioners confirm agreement in principle to the proposed surface water discharge to Hensall Dyke, subject to a consent application (in accordance with Section 66 of the Land Drainage Act) being submitted in due course.	Discharge of surface water to Hensall Dyke is included in the Indicative Drainage Strategy (Annex 5 of Appendix 11A in ES Volume III).
Marine Management Organisation	16th February 2017 (formal consultation response on	The PEI Report identifies the works required for the upgrading or replacement of infrastructure at the existing discharge point on the south	The works required for upgrading or replacement of infrastructure at the existing discharge point on the south side of the River Aire at

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
	PEI Report)	side of the River Aire at Eggborough Ings are below Mean High Water Springs (MHWS). The MMO would highlight that activities in discharge pipelines are licensable under the Marine and Coastal Access Act (2009) up to where tidal ingress stops.	Eggborough Ings is summarised in Chapter 5: Construction Programme and Management. The need for appropriate licences is noted and included in the Other Consents and Licences document (Application Document Ref. No. 5.4).
		At the River Aire discharge point, the suggested 'worst case' scenario for potential environmental impacts in the marine environment from the proposed construction works is the installation of a temporary cofferdam. The PEI Report does not fully expand on the required works needed, nor set out a detailed methodology to achieve the aim of upgrading the existing discharge point. Further details on the proposed methodology for carrying out these works should be included within the ES.	The construction works in the River Aire associated with alterations to the proposed cooling water discharge point are described in Chapter 5: Construction Programme and Management with supporting plans, Figures 5.1 and 5.2 in Volume II, Chapter 5 - Construction Programme and Management of this ES.
		When considering the works required to upgrade or replace the discharge point, the ES should have regard for potential impacts upon river navigation, marine ecology, hydrodynamics, recreational fishing, and other marine users. As with all licensable activities within the marine environment, the MMO would expect to see a thorough and robust assessment of impacts upon marine receptors and clear justification provided for any impact pathways which have	The effects of the proposed cofferdam at the cooling water discharge point in terms of potential impacts on the attributes of the River Aire, including navigation, recreational fishing and other marine users (broadly classed as recreation) are assessed within this chapter, whilst the effects on wider ecology are assessed in Chapter 10: Ecology and Nature Conservation. Appropriate mitigation measures are included within

Consultee	Date (method of consultation)	Summary of consultee comments	Summary of response/ how comments have been addressed
		been scoped out.	Section 11.5 (and Section 10.5 of Chapter 10: Ecology and Nature Conservation).
		Any predicted impacts caused by a potential change to the water temperature flowing into the River Aire at the discharge point during the operation of the CCGT Power Station should be identified and assessed within the ES.	The impacts of potential changes to the water temperature flowing into the River Aire are assessed in this chapter whilst the effects on wider ecology are assessed in Chapter 10: Ecology and Nature Conservation.
		Potential maintenance activities to the discharge point should be considered across the whole operation of the proposed development. This will ensure that impacts to the marine environment are appropriately assessed for the lifetime of the project and all reasonably foreseeable licensable activities could be captured within a deemed marine licence (DML).	The impacts of potential maintenance activities during the operation phase of the development are assessed within this chapter.

Summary of Key Changes to Chapter 11 since Publication of the Preliminary Environmental Information (PEI) Report

11.3.22 The PEI Report was published for statutory consultation in January 2017, allowing consultees the opportunity to provide informed comment on the Proposed Development, the assessment process and preliminary findings through a consultation process prior to the finalisation of this ES.

11.3.23 The key changes since the PEI Report was published are summarised in Table 11.5 below.

Table 11.5: Summary of key changes to Chapter 11 since publication of the PEI Report

Summary of change since PEI Report	Reason for change	Summary of change to chapter text in the ES
Cofferdams have been confirmed as being required at the Proposed Cooling Water Connection abstraction and discharge locations – this was only discussed as a possibility in the PEI Report.	Updated design information regarding works required to the cooling water abstraction and discharge points – cofferdams are required to allow construction activities to take place safely within the River.	The assessment has considered the potential impact of cofferdams on bank erosion and scour as well as flood risk.

11.4 Baseline Conditions

Existing Baseline

Topography

11.4.1 Based on available topographic data from surveys (Appendix 11A, Annex 2 in ES Volume III.) and LiDAR the existing coal-fired power station site (which includes the majority of the Site) is fairly flat with the highest areas being in the south-central portions, approximately 12.5 m Above Ordnance Datum (mAOD). It generally slopes from the centre towards the existing coal-fired power station site boundaries with the exception of the southern boundary (around the main coal stockyard), which features a large embankment. The lowest areas are generally in the north-east of the existing coal-fired power station site with levels between approximately 7.0 and 8.0 mAOD.

11.4.2 Ground levels along the Proposed Gas Connection corridor are generally level with ground levels falling to approximately 6 mAOD in the vicinity of Manor Cottages, to the south- east of Chapel Haddlesey. Further north and to the north-west, ground levels slightly increase with levels between approximately 6.0 and 7 mAOD.

Drainage

11.4.3 Drainage information with regards the existing Eggborough Power Station site is presented in Appendix 11A, Annex 5 in ES Volume III and is summarised below.

11.4.4 The existing Eggborough Power Station site drainage system collects surface water and pumps it to a concrete ash reservoir, where it is mixed with other process water and used to transport Pulverised Fuel Ash (PFA) to Gale Common. Within this drainage system there are three separate catchments associated with internal access roads, each connected to an oil interceptor prior to the connection to the ash reservoir. There are also separate catchments for the coal stockyard and existing contractor's hardstanding areas (in the vicinity of Hensall Gate), which also connect to the ash reservoir. The existing drainage catchments across the existing coal-fired power station site are broadly summarised as follows:

- the north-west part of the existing coal-fired power station site, including the area around the northern part of the National Grid 400 kV sub station and turbine hall, drain via pipes, drains and gullies to an oil interceptor located to the south-west of the existing cooling towers before reaching the ash reservoir;
- the central north-east part of the existing coal-fired power station site, including the flue gas desulpherisation plant to the east of the main power station buildings (turbine hall and boiler house) drains via pipes, drains and gullies to an oil interceptor located to the south-east of the existing cooling towers before reaching the ash reservoir;
- the west and southern parts of the existing coal-fired power station site, including the southern part of the National Grid 400 kV sub station and turbine hall, drain via pipes, drains and gullies to an oil interceptor located to the north-west of the existing rail loop;
- the coal stockyard in the south of the existing coal-fired power station site has a perimeter drain which drains to a sump at the south-east of the coal stockyard, from where it is pumped to the ash reservoir;
- the easternmost parts of the existing coal-fired power station site including the emergency coal stockyard to the north-east of the rail loop and gravelled storage/ laydown areas drain via a combination of soakaways (although localised flooding is known to have occurred here) and a drainage system that is pumped to the ash reservoir.

11.4.5 The majority of land located within the route of the Proposed Gas Connection corridor comprises arable land and surface water drains naturally to ground via infiltration (with the assistance of land drains – see further description of these below). Surface water from local roads is assumed to drain to existing highway drainage infrastructure.

Surface Waterbodies

River Aire

11.4.6 The River Aire (Main River) flows from north-west to south-east and is located to the north of the existing coal-fired power station. At its closest point the River Aire is located approximately 650 m north/ north-east of the Proposed Construction Laydown Area and approximately 1.1 km north/ north-east of the Proposed Power Plant Site, at a meander known as Eggborough Ings (as shown in Figure 11.1 (ES Volume II)).

11.4.7 The tidal extent of the River Aire is located at Chapel Haddlesey, which is approximately 1.2 km north of the existing power station site (as shown in Figure 11.1 (ES Volume II)). Cooling water used by the existing coal-fired power station is drawn from the River Aire via a pumphouse in Chapel Haddlesey and discharged back to the River via an outfall approximately 1 km downstream of the abstraction point. There is a large weir between the abstraction and discharge points, and this coincides with the tidal limit of the River. A hydro-electric power scheme is currently being installed at the weir (see Chapter 20: Cumulative and Combined Effects).

11.4.8 The wetted river channel is approximately 25 - 30 m wide and appears to be several metres deep. The water is very turbid with suspended sediment and the flow is generally slack within the reach adjacent to the Site. Flood embankments are present on the south bank of the River and on the north bank downstream of properties within Chapel Haddlesey.

11.4.9 The River Aire will be crossed by the Proposed Gas Connection at Eggborough Ings and the existing and Proposed Cooling Water Connections link to the River Aire (as shown in Figure 3.2 (ES Volume II)).

Ings and Tetherings Drain

11.4.10 Ings and Tetherings Drain (Ordinary Watercourse) is located approximately 360 m to the north of the Proposed Construction Laydown area. The watercourse flows from north-west to south-east through Eggborough Ings, situated on land between the existing power station site and the River Aire (as shown in Figure 11.1 (ES Volume II)).

11.4.11 In this location the wetted channel is approximately 2 m wide and up to 1 m deep, with no discernible flow. Ings and Tetherings Drain is a tributary of the River Aire and falls under the jurisdiction of the Danvm Drainage Commissioners. The drain forms a confluence, via a pumped discharge, with the River Aire approximately 2.2 km to the east of the existing coal-fired power station site.

11.4.12 Ings and Tetherings Drain will be crossed by the Proposed Cooling Water Connections and Proposed Gas Connection corridor south of Eggborough Ings (as shown in Figure 3.2 (ES Volume II)).

Hensall Dyke

11.4.13 Hensall Dyke is located immediately to the south-east of the Proposed Power Plant Site (as shown in Figure 11.1 (ES Volume II)) and falls under the jurisdiction of the Danvm Drainage Commissioners.

11.4.14 Historically, Hensall Dyke is believed to have flowed through the existing coal-fired power station site and been the point of natural drainage for much of the existing coal-fired power station site prior to development.

11.4.15 A walkover survey identified an existing pipe/ culvert present beneath the coal stockyard embankment that has been sealed to prevent surface water leaving the existing coal-fired power station site (Appendix 11A, Annex 5 in ES Volume III).

11.4.16 Downstream of the existing coal-fired power station site, Hensall Dyke flows to the south-east towards the village of Hensall. The watercourse then turns north, becoming Beck Drain downstream of Hensall and forms a confluence with Ings and Tetherings Drain approximately 780 m east of the Proposed Construction Laydown area.

Minor Watercourses/ Drainage Ditches

11.4.17 Drainage channels are frequent within arable land in the Proposed Gas Connection corridor, the majority of which held no standing water at the time of the ecological walkover survey (Appendix 10C – Preliminary Ecological Appraisal (PEA) Report (ES Volume III). Most dry ditches/ drains have a channel width of 2 – 3 m and depth of 2 m. Ditch banks are generally steep and the bases of channels generally comprise bare earth or grassland. These drainage features are mostly associated with field boundaries.

11.4.18 There are also smaller field drains in places, with channels less than 1 m wide and deep.

11.4.19 Drainage channels are also present within the existing coal-fired power station site, including butyl lined drains adjacent to hard standing areas and concrete lined drains around coal stockyard areas. These were also dry at the time of the ecological survey.

Other Surface Water Features

11.4.20 Six ponds/ other areas of standing water (excluding wet ditches/ drains) were identified within the Site boundary by a combination of desk study and field survey (as shown in Figure 10E.1 (ES Volume II)). These are detailed in Table 11.6 below.

Table 11.6: Standing waterbodies within the Site boundary

Feature Number	Description
1	A large man-made, butyl lined reservoir (lagoon), 1.3 ha in size and stocked with coarse fish. The open water is relatively clear and up to 1 m deep. The lagoon is surrounded on all sides by earth banks, supporting grass coniferous screening woodland.
2	A man-made pond, 500 m^2 in size, within a landscaped area adjacent to the existing coal-fired power station cooling towers. The open water is clear and up to 1 m deep. There are raised banks around the pond margins supporting dense scrub and coniferous woodland. Fish are known to have been stocked in the past.
3	A concrete lined surface water attenuation tank supporting no aquatic vegetation. The tank is regularly drained and has a thick layer of silt at the base.
4	Concrete tanks and channels associated with the existing coal-fired power station cooling water system. These do not support any aquatic vegetation and are regularly drained.
5	A small ornamental pond adjacent to office buildings within the existing coal-fired power station site. The pond is stocked with goldfish and surrounded by hard standing.
6	An area of open water shown on OS maps to the north of the River Aire. This was found to be a dry depression on land between the top of the river bank and the adjacent flood embankment. The base of the depression supports species poor semi-improved grassland and no aquatic or marshy vegetation, indicating that it does not regularly hold water. It is only likely to be inundated if the river floods.

11.4.21 Six further ponds/ standing water bodies are visible on OS maps/ aerial imagery within a 250 m radius of the Site.

Canals

11.4.22 There are two canals located in the wider vicinity of the Site (as shown in Figure 11.1 (ES Volume II)). The Selby Canal is located approximately 800 m to the west of the Proposed Cooling Water Connection abstraction point, and approximately 300 m west of the Proposed

AGI. As the Canal is located upstream of the proposed works it is considered that this watercourse will not be affected by the Proposed Development.

11.4.23 The Calder Navigation (canal) is located approximately 1 km to the south of the Proposed Borehole Water Connection point at the A19/ A645 Weeland Road junction and has no direct or indirect hydrological link to the River Aire within the study area.

11.4.24 Information obtained during the desk study indicates that due to distance and location no direct or indirect hydrological links exist between the canals and the Site therefore the canals are not considered further in this assessment.

Surface Water Quality

11.4.25 The Environment Agency surveys all main watercourses in England and Wales on a regular basis in order to analyse monitor and review status waterbodies against the WFD objectives set out for them. The WFD required all waterbodies to reach at least 'Good status' or 'Good potential' by 2015. However, provided that certain conditions are satisfied, in some cases the achievement of Good status may be delayed until 2021 or 2027.

11.4.26 For surface waters, Good status is a statement of 'overall status', which in turn consists of chemical and ecological components. Chemical status considers priority substances that present a significant risk to the water environment. Chemical status is classified 'good' or 'fail'. Ecological status is measured on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The ecological status takes into account physico-chemical elements, biological elements, specific pollutants and hydromorphology.

11.4.27 Some waterbodies are designated 'artificial' or 'heavily modified' and are not able to achieve near natural conditions. For this reason, the classification of these waterbodies and the biology they represent are measured against 'ecological potential' rather than status.

11.4.28 For an artificial or heavily modified waterbody to achieve good ecological potential, its chemistry must be good. In addition, any modifications to the structural or physical nature of the waterbody that would harm its biology must be essential for its valid use. For an artificial or heavily modified waterbody to achieve good ecological potential, all other modifications must have been altered or managed to reduce or remove their adverse effects, so that there is the potential for the biology of the waterbody to be as close as possible to that of a similar natural waterbody.

River Aire (includes Ings and Tetherings Drain)

11.4.29 The River Aire at this location (defined in the WFD as 'GB104027062760 - River Aire from River Calder to River Ouse' i.e. the reach between the confluences with the River Calder and the River Ouse) is classified as heavily modified due to the presence of flood defences and navigation modifications. The River Aire waterbody is currently of moderate ecological potential with regards to the WFD and is currently meeting good chemical potential (this section of the River Aire includes Ings and Tetherings Drain which flows from west to east approximately 500 m north the existing power station site). Good ecological potential and good chemical status is expected to be met in 2027. Overall, the River Aire is classified as having moderate potential.

11.4.30 There are a range of pressures on the River preventing it achieving good ecological potential, including discharges upstream and direct to the Humber Estuary, recreation and commercial uses of the river, dredging etc.

11.4.31 Mitigation measures already in place on the River Aire (including Ings and Tetherings Drain), as part of the WFD, include the strategic management of sediment, bank rehabilitation, reducing the impact of dredging and reducing sediment suspension. These mitigation measures are taken into account as part of this baseline assessment.

11.4.32 Tables 11.7 to 11.10 below provide an overview of the biological elements, supporting elements, conditions, ecological potential assessment and the chemical elements for the River Aire.

Table 11.7: Biological elements

Element	Current status (2015) and certainty of less than good	Predicted status in 2021	Predicted status in 2027	Justification for not achieving good status in 2015
Invertebrates	Poor (very certain)	Poor	Good	Disproportionately expensive
Macrophytes and phytobenthos	Moderate (quite certain)	Moderate	Good	Disproportionately expensive

Table 11.8: River Aire supporting elements

Element	Current status (2015) and certainty of less than good	Predicted status in 2021	Predicted status in 2027	Justification for not achieving good status in 2015
Dissolved oxygen	High	High	High	N/A
2,4-dichlorophenol	High	High	High	N/A
2,4-dichlorophenoxyacetic	High	High	High	N/A
Arsenic	High	High	High	N/A
Copper	High	High	High	N/A
Cyanide	High	High	High	N/A
Iron	High	High	High	N/A
Mecoprop	High	High	High	N/A
Permethrin	High	High	High	N/A
Un-ionised ammonia	Good	Good	Good	N/A
Zinc	High	High	High	N/A

Table 11.9: River Aire ecological assessment

Element	Current status (2015) and certainty of less than good	Predicted status in 2021	Predicted status in 2027	Justification for not achieving good status in 2015
Mitigation measures assessment	Moderate or less	Moderate or less	Good	Disproportionately expensive

Table 11.10: River Aire chemical elements

Element	Current status (2015) and certainty of less than good	Predicted status in 2021	Predicted status in 2027	Justification for not achieving good status in 2015
1,2-dichloroethane	Good	Good	Good	N/A
Atrazine	Good	Good	Good	N/A
Benzene	High	-	-	-
Benzo (ghi) perylene and indeno (123-cd) pyrene	Good	Good	Good	N/A
Cadmium and its compounds	Good	Good	Good	N/A
Hexachlorobenzene	Good	-	-	-
Hexachlorobutadiene	Good	-	-	-
Hexachlorocyclohexane	Good	Good	Good	N/A
Lead and its compounds	Good	Good	Good	N/A
Mercury and its compounds	Good	Good	Good	N/A
Napthalene	Good	Good	Good	N/A
Nickel and its compounds	Good	Good	Good	N/A
Nonylphenol	Good	Good	Good	N/A
Pentachlorophenol	Good	Good	Good	N/A
Simazine	Good	Good	Good	N/A
Tributyltin compounds	Fail (very certain)	-	-	-
Trichlorobenzenes	Good	Good	Good	N/A

Element	Current status (2015) and certainty of less than good	Predicted status in 2021	Predicted status in 2027	Justification for not achieving good status in 2015
Trichloromethane	Good	Good	Good	N/A
Trifluralin	Good	-	-	-
Aldrin, dieldrin, endrin and isodrin	Good	Good	Good	N/A
Carbon tetrachloride	Good	Good	Good	N/A
DDT total	Good	Good	Good	N/A
Para – para DDT	Good	Good	Good	N/A
Tetrachloroethylene	Good	Good	Good	N/A
Trichloroethylene	Good	Good	Good	N/A

11.4.33 Proposed mitigation measures (within the RBMP) for the River Aire to achieve good ecological potential include the preservation of marginal aquatic habitat, banks and the riparian zone, improving floodplain connectivity, appropriate vegetation control, set back and the removal of obsolete structures.

11.4.34 Mitigation measures already in place on the River Aire include the strategic management of sediment, bank rehabilitation, a reduction in the impact of dredging and sediment suspension.

11.4.35 The River Aire is considered to be a water resource receptor of very high importance with respect to water quality, as it has water quality objectives under the WFD and, given the size of the river channel, has a Q95 ≥ 1.0 m^3/s.

11.4.36 The Ings and Tetherings Drain is considered to be a water resource receptor of high importance with respect to water quality objectives under the WFD, and given the nature of the watercourse, has a Q95 < 1.0 m^3/s.

Hensall Dyke

11.4.37 Hensall Dyke is not designated under the WFD and therefore has no designation in the RBMP and the Environment Agency has no water quality data for the watercourse. Hensall Dyke is a tributary of the Ings and Tetherings Drain, therefore for the purpose of this assessment, it is inferred that the water quality classification for Hensall Dyke is likely to be the same as that of the Ings and Tetherings Drain, as outlined above.

11.4.38 Hensall Dyke is considered to be a water resource receptor of medium importance with respect to water quality because the watercourse is detailed in the Digital River Network but does not have a WFD classification.

Minor Watercourses/ Drainage Ditches

11.4.39 The identified minor watercourses and drainage ditches identified within the study area have no WFD designation and there is no water quality data available.

11.4.40 The minor watercourses and drainage ditches are considered to be a water resource receptor of low importance with respect to water quality due to their functions as surface water or agricultural drainage.

Other Surface Water Features

11.4.41 All other surface water features identified within the study area have no WFD designation and there is no water quality data available.

11.4.42 The other surface water features are considered to be a water resource receptor of low importance with respect to water quality due to their functions as ornamental use, surface water or agricultural drainage.

Surface Water Abstractions and Discharges

11.4.43 The Groundsure report (Appendix 12B – ES Volume III) records three currently licensed surface water abstractions on site for the purpose of irrigation, evaporative cooling and potable water supply, all located on the northern offshoot corridor.

11.4.44 The combined Maximum Daily Volume of the licenced site surface water abstractions from the River Aire is approximately 235,284 m^3. Of this 231,280 m^3 is used by the existing coal-fired power station for evaporative and non-evaporative cooling.

11.4.45 There are a further ten surface water abstraction licenses recorded within a 1 km radius of the Site for hydroelectric power generation, evaporative cooling and irrigation. There are no surface water abstraction licenses within the gas connection corridor.

11.4.46 Data from the Groundsure Report (Appendix 12B – ES Volume III) indicates that there are eight active discharge licenses within 500 m of the Site. Of the identified discharge licenses there are three located within 20 m of the Site.

11.4.47 Two of the discharges, located on-site and approximately 4 m to the south-east, are for trade discharge – site drainage. One discharge approximately 14 m to the west is for process effluent, one discharge approximately 207 m to the north-west is for final treated effluent. Two discharge licences are registered to Eggborough Waste Water Treatment Works, approximately 208 m north-east of the existing coal-fired power station site and are for storm water overflows. The final two discharges are located approximately 303 m to the north-east and are for final treated effluent.

11.4.48 The River Aire is considered to be a water resource receptor of very high importance with respect to water supply due to the Maximum Daily Volume water abstraction: >1,000 m^3.

<u>Point Source Pollutants</u>

11.4.49 Pollution incidents are classified by the Environment Agency on the degree of Environment Agency manpower deployed (i.e. large, small) and likely environmental impact with regard to

air, water and land. Incidents are classified as category 1 (major), 2 (significant), 3 (minor) or 4 (insignificant).

11.4.50 There have been six pollution incidents within 1 km of the Site since November 2001. Of those incidents two were category 4 (insignificant) incidents to water and three were category 3 (minor) incidents to water. One of the incidents was classified as a category 2 (significant) incident to water, located approximately 309 m to the north-east of the Site and from other sewage material. The incident was in 2001 and unlikely to have impacted on water quality and therefore is not anticipated to have any implications for the Proposed Development.

Non-Point Source Pollutants

11.4.51 Upstream of the Site urban, commercial/ industrial and agricultural runoff may enter the watercourses identified below, and this may affect the status of the watercourses.

Recreation

11.4.52 The study area is crossed with Public Rights of Way (PRoW) which allow access to the River Aire, Ings and Tetherings Drain and a number of the minor watercourses/ drainage ditches.

11.4.53 Recreational use within the study area will include horse riding, walking, bird watching, fishing and boating, with the River Aire used for general navigation, providing access to the Selby Canal and Calder Navigation upstream of the Site.

11.4.54 The River Aire is considered to be a water resource receptor of high importance with respect to the recreation uses outlined above.

11.4.55 Due to the limited public access to the waterbodies via PRoWs, Ings and Tetherings Drain, Hensall Dyke, the minor watercourses and other identified water features are considered to be water resource receptors of low importance with respect to recreation.

Biodiversity

11.4.56 The River Aire and the Ings and Tetherings Drain, as defined in the RBMP, are designated under the Freshwater Fish Directive and Nitrates Directive.

11.4.57 There are no Sites of Special Scientific Interest (SSSIs) within 5 km of the Site.

11.4.58 The River Derwent Special Area of Conservation (SAC) is located 9.5 km to the east of the Site. There are no Special Protection Areas (SPAs) or Ramsar sites within 10 km of the Site. However, the Humber Estuary SPA/ SAC/ Ramsar/ Site of Special Scientific Interest (SSSI), located approximately 15 km downstream from the Site, is in connectivity with the River Aire, which is crossed by the Proposed Gas Connection and into which the Cooling Water Connections are linked. Given the distance from the Site and the level of dilution provided within the both the River Aire and the Humber Estuary these are not considered as receptors within this assessment.

11.4.59 Indirect effects on the Humber Estuary SPA/ SAC/ Ramsar/ SSSI via the River Aire, are considered in Chapter 10: Ecology and Nature Conservation.

11.4.60 There are two non-statutory nature conservations designations within 1 km of the Site, the closest being Selby Canal and Towpath Site of Importance for Nature Conservation (SINC) located approximately 300 m to the north-west of the Site.

11.4.61 In line with the examples provided in Table 11.1, both the River Aire and the Ings and Tetherings Drain are considered to be water resource receptors of high importance with respect to biodiversity due to ecological objectives under the WFD and designation under the Freshwater Fish Directive.

11.4.62 All other waterbodies identified in the assessment are considered to be water receptors of low importance with regards biodiversity as they are not designated for nature conservation value, but may provide habitat to fauna and flora.

Superficial Geology

11.4.63 A review of the Groundsure reports (Appendix 12B – ES Volume III), British Geological Survey (BGS) 1:50,000 solid and drift geology sheet 79 for Goole, existing site investigation records and publically available BGS borehole records indicates the following superficial deposits may be present beneath the Site:

- Alluvium – recent alluvium, present in a narrow corridor along the River Aire (extending approximately 1.2 km north-east to approximately Millfield Road);
- Lacustrine beach deposits – shingle, sand, silt and clay; present at the north-western corner of the Proposed Power Plant Site;
- Breighton sand formation – dominantly yellow, slightly clayey sand to silty, which appears to be absent beneath the Proposed Power Plant Site, but present in a 250 m corridor immediately north-east of Wand Lane and a 300 m band from approximately Millfield Road to Fox Lane;
- Hemingbrough glacio-lacustrine deposits shown to underlie the south-eastern corner of the Proposed Power Plant Site and areas of the Site between approximately Fox Lane and West Lane ; and
- Glacial till – typically sandy and gravelly clays, with cobbles and boulders. The geological map indicates that these deposits may encroach onto the extreme south-western corner of the Proposed Power Plant Site.

11.4.64 Given that much of the Proposed Power Plant Site is occupied by the coal stockyard for the existing coal fired power station, the presence of made ground is also anticipated.

11.4.65 Further details on the superficial geology are found within Chapter 12: Geology, Hydrogeology and Land Contamination.

Bedrock Geology

11.4.66 The geological map and Groundsure report (Appendix 12B – ES Volume III) indicate that the Site (including both Proposed Power Plant Site and Proposed Cooling Water and Gas Connections) is underlain by Sherwood Sandstone.

11.4.67 Further details on the bedrock geology are found within Chapter 12: Geology, Hydrogeology and Land Contamination.

Hydrogeology

11.4.68 The Environment Agency aquifer classifications for the identified superficial deposits underlying the site, as detailed above, is summarised in Table 11.11 below.

Table 11.11: Summary of Environment Agency aquifer classifications for superficial deposits

Formation	Environment Agency aquifer classification	Aquifer definition
Superficial deposits		
Lacustrine Beach Deposits	Secondary A Aquifer	Defined by the EA as '*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. These are generally aquifers formerly classified as minor aquifers'*.
Alluvium	Secondary A Aquifer	
Breighton Sand	Secondary A Aquifer	
Glacial Till (clay)	Secondary Undifferentiated Aquifer	Defined by the EA as '*an aquifer where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.*'
Hemingbrough Formation	Unproductive Strata	Defined by the EA as '*rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow'*.
Bedrock		
Sherwood Sandstone	Principal Aquifer	Defined by the EA as '*layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer'*.

Groundwater Quality

11.4.69 The entire Site, with the exception of the southern Proposed Borehole Water Connection and the northern end of the Proposed Gas Connection, is located in a groundwater Source Protection Zone (SPZ) 3 (total catchment).

11.4.70 WFD status for groundwater consists of two components: quantitative and chemical status. These two components result in a single final classification of Good or Poor status.

Shallow Groundwater

11.4.71 The underlying superficial geology comprises a Minor Aquifer. It is likely that groundwater quality in the superficial strata in the vicinity of the Site is poor, due to historical industrial and mining activity.

11.4.72 Soils at the Site (except those associated with glaciolacustrine superficial deposits) are classified as being of a high leaching potential, meaning that they readily transmit liquid discharges and pollutants.

11.4.73 Using the examples presented in Table 11.1 the shallow groundwater is considered to be a water resource of medium importance with respect to water quality (i.e. no WFD designation and designated Secondary Aquifer).

Deep Groundwater

11.4.74 The underlying bedrock geology is classified as a Principal Aquifer with high permeability. These are highly permeable formations usually with a known or probable presence of significant fracturing.

11.4.75 The groundwater is designated as a Drinking Water Protected Area and under the Nitrates Directive.

11.4.76 The WFD status of the local groundwater (GB40401G701000 – Aire and Don Sherwood Sandstone) is currently failing chemical status, but is predicted to achieve Good chemical status by 2027, and the quantitative status is currently good and is expected to remain as Good in 2027. The current overall status of the aquifer unit is Poor with the objective to meet Good overall status by 2027.

11.4.77 The Aire and Don Sherwood Sandstone waterbody is considered to be a water resource receptor of high importance with respect to water quality having a WFD classification as shown in a RBMP, and the designation as a Principal Aquifer (not within SPZ 1).

Groundwater Abstractions

11.4.78 The Sherwood Sandstone, as a Principal Aquifer, is extensively utilised in the region. Principal Aquifers may be highly productive and able to support large abstractions for public water supply and other purposes.

11.4.79 As noted above, the Aire and Don Sherwood Sandstone is designated as a Drinking Water Protected Area.

11.4.80 The Groundsure Report (Appendix 12B, ES Volume III) records two active groundwater abstractions on the Proposed Power Plant Site; one for EPL for the abstraction of a maximum of 4,800 m^3 per day for use as a boiler feed and one for The Hambleton Abstraction Partnership for the abstraction of a maximum of 900 m^3 per day for use in irrigation. Both abstractions are from the Sherwood Sandstone Principal Aquifer. There are also a further thirty-nine historical groundwater abstraction licences recorded 2 km of the Site including for potable water, farming and domestic use.

11.4.81 There are no groundwater abstractions recorded within the Proposed Gas Connection corridor.

11.4.82 The Aire and Don Sherwood Sandstone waterbody is considered to be a water resource receptor of very high importance with regard to water supply with licenced water abstractions >1,000 m^3/day and having designation as a Drinking Water Protected Area.

Flood Risk

11.4.83 The importance of receptors in the context of flood risk relates to the NPPF vulnerability classification for land uses potentially affected by any changes in flood risk as a result of the Proposed Development. Potential receptors could therefore be occupiers or users of the Proposed Development itself, as well as users or occupiers of land outside of the Site boundary that could be affected by changes to flood risk resulting from the Proposed Development. The receptor importance is therefore defined independently of the sources of flood risk.

11.4.84 The NPPF considers the vulnerability of different forms of development to flooding and classifies proposed uses accordingly. The Proposed Development is considered as 'Essential Infrastructure' in the NPPF vulnerability classification and as such it is assigned as a receptor of very high importance. The vulnerability and hence importance of receptors elsewhere has been defined where flood risk impacts have the potential to occur.

11.4.85 A FRA has been undertaken to ascertain if the Site is at risk of flooding or if the Proposed Development of the Site would cause an increase in the off-site flood risk (Appendix 11A – Flood Risk Assessment - ES Volume III). The FRA has been prepared in accordance with the NPPF and supporting PPG. For further information on flood risk, the FRA should be consulted, although the section below provides a summary of flood risk for the Proposed Development:

- the Proposed Power Plant Site, CCR Land and the southern area of the Proposed Construction Laydown area are located in Flood Zone 1 and is deemed at low risk of flooding from fluvial/ tidal sources (note this is not as shown on the EA flood maps, which are based on high-level information, but has been demonstrated by more recent EA modelling data and topographical data – see Appendix 11A, ES Volume III);
- the Proposed Gas Connection corridor is located predominantly in Flood Zones 3a and 3b and is therefore deemed at high risk of flooding from fluvial/ tidal sources;
- the northern part of the Proposed Construction Laydown area is also located in Flood Zone 3 and is therefore at high risk of flooding from fluvial/ tidal sources;
- the proposed works represent 'Essential Infrastructure' and are therefore appropriate to Flood Zones 3a and 3b subject to satisfying the Exception Test;
- the proposed works satisfy the two parts of the Exception Test; they will have wider sustainability benefits for the local community and will also be safe, taking account of the vulnerability of users and will not increase the risk of flooding, since the only works proposed in Flood Zones 3a and 3b are the installation of an underground pipe;
- the site is located in the vicinity of a number of watercourses and drainage ditches managed by the Selby IDB and Danvm Drainage Commission. It is considered that flood risk to the study area from these watercourse drainage catchments is low. During high return period storm events, the predominant flood risk to the area is from the River Aire;
- the impact of climate change is unlikely to increase the extent of fluvial/ tidal flooding to the north of the existing power station site, however, flood depths are likely to increase. It is recommended that the 8 mAOD contour that runs through the northern section of the

existing power station site is retained to contain flood water to areas considered to flood under the existing scenario;

- the EA's map showing the risk of flooding from reservoirs in the event of a failure identifies the majority of the Site is located within an area identified as being at risk. Reservoir flooding is extremely unlikely to happen. All large reservoirs must be inspected and supervised by reservoir panel engineers on a yearly basis. For this reason the risk of flooding from reservoirs to the site is considered to be low;
- the risk of flooding from the Selby Canal and the Aire and Calder Navigation is considered to be low; and
- the risk of flooding from groundwater and sewer sources is considered to be low.

11.4.86 The FRA (Appendix 11A - ES Volume III) serves to demonstrate that the Proposed Development will remain safe during its lifetime and will not increase flood risk elsewhere and is, therefore, considered to be acceptable in flood risk terms.

Summary of Baseline Conditions and Importance of Existing Resource

11.4.87 Only surface watercourses in close proximity (hydraulic connectivity) to the Site and with the significant potential to be affected by the Proposed Development have been considered further within this impact assessment.

11.4.88 Table 11.12 describes the importance of the waterbodies in the vicinity of the Proposed Development.

Table 11.12: Importance of identified water resource receptors

Receptor	Attributes	Importance
Surface water		
River Aire	Water quality WFD: Moderate Potential (good chemical potential, moderate ecological potential)	Very high
	Water supply Number of industrial abstractions with a volume >1,000 m^3/day	Very high
	Recreation/ other uses Various including horse riding, walking, bird watching, fishing and boating General navigation.	High
	Biodiversity WFD: Moderate ecological potential Designated Freshwater Fish Directive	High
Ings and Tetherings Drain	Water quality WFD: Moderate Potential (good chemical potential, moderate ecological potential)	High
	Recreation/ other uses Limited access for horse riding, walking, bird watching.	Low
	Biodiversity WFD: Moderate ecological potential Designated Freshwater Fish Directive	High

Receptor	Attributes	Importance
Hensall Dyke	Water quality Detailed in the Digital River Network but does not have a WFD classification	Medium
	Recreation/ other uses Limited access for horse riding, walking, bird watching.	Low
	Biodiversity Not designated for nature conservation value, but may provide habitat to fauna and flora (see Chapter 10: Ecology and Nature Conservation)	Low
Minor watercourses/ drainage ditches	Water quality Functions as surface water or agricultural drainage	Low
	Recreation/ other uses Limited access for horse riding, walking, bird watching.	Low
	Biodiversity Not designated for nature conservation value, but may provide habitat to fauna and flora (see Chapter 10: Ecology and Nature Conservation)	Low
Other surface water features	Water quality Functions as surface water or agricultural drainage	Low
	Recreation/ other uses Limited access for horse riding, walking, bird watching.	Low
	Biodiversity Not designated for nature conservation value, but may provide habitat to fauna and flora (see Chapter 10: Ecology and Nature Conservation)	Low
Groundwater		
Principal Aquifer (Aire and Don Sherwood Sandstone)	Water quality WFD: failing chemical status, quantitative status Good Principal Aquifer	High
	Water supply Water supply potable uses Industrial abstractions >1,000 m^3/day Designated as a Drinking Water Protected Area	Very high
Secondary A Aquifer (Lacustrine Beach Deposits, Alluvium, and Breighton Sand)	Water quality No WFD designation Secondary A Aquifer	Medium

Receptor	Attributes	Importance
Flood risk		
The Proposed Development*	Flood risk receptors (Vulnerability Classification)	Very high

* *vulnerability of flood risk receptors elsewhere is determined on a case by case basis where flood risk elsewhere could be increased by the Proposed Development.*

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Future Baseline – Construction (2019)

11.4.89 Baseline conditions in 2019 are not expected to be significantly different to current baseline conditions. In respect of water quality, the WFD is driving improvements in waterbodies, but the deadline for the River Aire and the Ings and Tetherings Drain to achieve 'good' ecological and chemical potential is 2027, and it is not anticipated that significant progress will have been made by 2019. The future baseline (2019) is therefore assessed to be similar to current baseline conditions.

Surface Water

11.4.90 In terms of water quality, the River Aire currently has moderate ecological potential and has good chemical potential. It is expected that the water quality will improve in the future, meeting the requirements of the WFD (good ecological and chemical potential) by 2027. No substantial change is, however, expected by 2019.

11.4.91 No substantial changes are anticipated to all other identified waterbodies by 2019.

Groundwater

11.4.92 Groundwater quality of the underlying Principal Aquifer is currently of failing chemical status, quantitative status good. It is expected that groundwater status will improve in the future, meeting the requirements of the WFD (good quantitative status and good chemical quality by 2027). No substantial change is, however, expected by 2019.

11.4.93 No substantial changes are anticipated to Secondary A Aquifer by 2019.

Flood Risk

11.4.94 It is unlikely that that there will be any substantial change in the risk of flooding from all sources by 2019.

Future Baseline – Opening (2022)

11.4.95 By 2022, the decommissioning and demolition of the existing coal-fired power station is expected to have commenced (and may even have been completed). As described above, at present surface water from the existing coal-fired power station is collected and pumped to Gale Common to transport PFA. When the existing power station is decommissioned and demolished the existing pumped drainage system will no longer be in operation and surface water is anticipated to be attenuated within the existing power station site and discharged to local watercourses (River Aire, Ings and Tetherings Drain and/or Hensall Dyke), subject to agreement with the Environment Agency and relevant IDB. As such the discharge of surface

water from the areas of the Site within the existing coal-fired power station site will represent an increase in impact on local watercourses compared to the existing baseline conditions.

11.4.96 The topography across the existing power station site is also likely to be altered in the future baseline scenario as a result of demolition works. Inert materials such as concrete are intended to be crushed and re-used within the Site to minimise the volume of waste to be taken off site.

11.4.97 In the absence of the Proposed Development, cooling water abstraction and discharge to the River Aire associated with the existing coal-fired power station would have ceased by 2022.

11.4.98 All other baseline conditions in 2022 are not expected to be significantly different to the baseline conditions in 2019, as outlined above.

Future Baseline – Operation (2037)

11.4.99 In addition to the changes outlined above for the 2022 future baseline associated with the closure of the existing coal-fired power station, other baseline conditions in 2037 will be moderately different to current baseline conditions as set out below.

Surface Water

11.4.100 In terms of water quality, it is expected that water quality in the River Aire and the Ings and Tetherings Drain will improve, meeting the requirements of the WFD (good ecological and chemical potential) by 2027. Although water quality within the River Aire and the Ings and Tetherings Drain will have improved under this scenario, the importance of the water quality attribute will remain unchanged as the waterbodies will continue to have water quality objectives under the WFD and, it is assumed, the size of the respective river channels will remain unchanged.

11.4.101 No substantial changes are anticipated to all other identified waterbodies by 2037. It is noted that some of the other water features currently located within areas of the Site within the existing coal-fired power station site will no longer be present (due to the decommissioning and demolition of the existing coal-fired power station).

Groundwater

11.4.102 It is expected that groundwater status will improve by 2037, meeting the requirements of the WFD (good quantitative status and good chemical quality). It is unlikely that the importance of the groundwater attributes will change as the Aire and Don Sherwood Sandstone will continue to have water quality objectives under the WFD and will remain designated as a Principal Aquifer.

11.4.103 Water quality within the Secondary A Aquifer may have improved under this scenario however, no substantial changes are anticipated to the attributes of the Secondary A Aquifer by 2037.

Flood Risk

11.4.104 Based on the Environment Agency climate change guidance it is likely that the peak river flow in the River Aire, Ings and Tetherings Drain, Hensall Dyke and the minor watercourses will have

increased by a maximum of 20% by the year 2037, based on predictions for the Humber River Basin District. Peak rainfall intensity is also predicted to increase by a maximum of 10% across the same timescale.

11.4.105 The impact of climate change, as outlined above, is likely to increase the risk of flooding to the Proposed Development and the surrounding area from all sources with the predominant flood risks being fluvial and surface water flooding.

11.4.106 Given the potential changes outlined above, the future baseline (2037) is therefore assessed as a worst case scenario against the operational phase of the Proposed Development.

Future Baseline – Decommissioning (2047)

11.4.107 Assuming there is no change to current legislation, baseline conditions in 2047 for surface water and groundwater resources are not expected to be significantly different to the baseline conditions in 2037, as outlined above.

Flood Risk

11.4.108 Environment Agency climate change guidance predicts that the peak river flow in the River Aire, Ings and Tetherings Drain, Hensall Dyke and the minor watercourses will have increased by a maximum of 30% by the year 2047. Peak rainfall intensity is also predicted to increase by a maximum of 20% across the same timescale.

11.4.109 Based on the above, the impact of climate change is likely to increase the risk of flooding from all sources, above that predicted in 2037, to the Proposed Development and the surrounding area.

11.5 Development Design and Impact Avoidance

11.5.1 The Proposed Development has the potential to impact on both the surface and groundwater resources in the vicinity of the Site through both quality and quantity changes (though quantitative changes are only considered here in relation to the any general changes to the quantity of a waterbody as a resource).

11.5.2 The surface and ground waterbodies as described above have been assessed for the likelihood of actual effects occurring as a result of the Proposed Development.

Impact Avoidance

11.5.3 The following impact avoidance measures have either been incorporated into the design or are standard construction or operational practices. These measures have, therefore, been taken into account during the impact assessment process.

Construction

11.5.4 For the purposes of this assessment, it is assumed that the measures set out below will be required of any contractors undertaking construction work in relation to the Proposed Development.

11.5.5 As a general measure to protect ground and surface water from a range of potentially dangerous activities associated with construction of this type, best practice will be implemented through a Construction Environmental Management Plan (CEMP), whilst the contractors undertaking works at the Proposed Development will comply with relevant guidance during construction, including the Environment Agency PPGs listed at paragraph 11.2.38 above and IDB byelaws listed at paragraph 11.2.37. A framework CEMP has been prepared as part of this ES to support the DCO application (Appendix 5A – ES Volume III).

Staff Awareness/ Training

11.5.6 The contractor(s) will ensure that site personnel are fully aware of the potential impact to water resources associated with the proposed construction works and procedures to be followed in the event of an accidental pollution event occurring. This will be included in the site induction and training, with an emphasis on procedures and guidance to reduce the risk of water pollution.

Pollution Plans

11.5.7 Plans to deal with accidental pollution will be drawn up and agreed with the Environment Agency prior to construction commencing and will also be included within the CEMP. The CEMP will include specific measures to manage pollution risks during construction of the Proposed Cooling Water and Gas Connections, which involve works in/ near to/ under the River Aire, Ings and Tetherings Drain, and other minor watercourses and drains. Works to the existing cooling water abstraction and discharge infrastructure may require the use of cofferdams. The Proposed Gas Connection will be directionally drilled under the tidal section of the River Aire (in accordance with a deemed marine licence (part of the DCO)), whereas open cut trench methods will be used to cross Ings and Tetherings Drain and other minor watercourses and drains.

11.5.8 Any necessary equipment (e.g. spillage kits) will be held on site and all site personnel will be trained in their use. The Environment Agency will be informed immediately in the unlikely event of a suspected pollution incident.

Storage of Materials

11.5.9 The CEMP will incorporate measures set out in the Environment Agency PPG documents listed at paragraph 11.2.38 above. Examples of such measures include:

- placing arisings and temporary stockpiles outside of the Flood Zone 3 flood extent wherever possible and away from drainage systems, and directing surface water away from stockpiles to prevent erosion;
- containment measures will be implemented, including drip trays, bunding or double-skinned tanks of fuels and oils; all chemicals will be stored in accordance with their Control of Substances Hazardous to Health (COSHH) guidelines (Health and Safety Executive, 2002), whilst spill kits will be provided in areas of fuel/ oil storage;
- an Emergency Spillage Plan will be produced, which site staff will have read and understood;
- the mixing and handling of materials will be undertaken in designated areas and away from surface water drains;

- plant and machinery will be kept away from surface water bodies wherever possible and will have drip trays installed beneath oil tanks/ engines/ gearboxes and hydraulics, which will be checked and emptied regularly. Refuelling and delivery areas will be located away from surface water drains; and
- exposed ground and stockpiles will be protected as appropriate and practicable to prevent windblown migration of potential contaminants. Water suppression will be used if there is a risk of fugitive dust emissions (see also Chapter 8: Air Quality).

Discharge/ Disposal of Site Runoff/ Material

11.5.10 Plans for the discharge and/ or disposal of potentially contaminated water will be agreed in advance with the Environment Agency, NYCC/ SDC and the relevant IDB where appropriate, and permits obtained as required. The existing Environmental Permit for the coal-fired power station is being substantially varied to accommodate the proposed gas-fired power station; therefore existing discharge points, monitoring, controls and limits will be retained and amended as appropriate to manage effluent discharges from the installation.

11.5.11 All foul water from any site compound (including temporary toilets) will be either tankered away to an appropriate disposal facility by a licensed waste disposal contractor, or discharged via connection to the existing foul sewer. Any potentially contaminated water will be tested, and if it is not of a suitable quality, agreed disposal procedures will be followed. Construction drainage details will be developed in consultation with the Environment Agency.

11.5.12 As will be detailed in the CEMP, if any suspected contaminated material is discovered during the works, it will be tested and dealt with appropriately. If material is considered to be contaminated it will be disposed of to a licensed facility (see also Chapter 12: Geology, Hydrogeology and Land Contamination).

11.5.13 Any waters removed from excavations by dewatering will be discharged appropriately, subject to the relevant licenses being obtained.

11.5.14 Foundations and services will be designed and constructed to prevent the creation of pathways for the migration of contaminants and will be constructed of materials that are suitable for the ground conditions and designed use. For example, water supply pipes will be designed in accordance with current good practice and applicable guidance to ensure pipes are protected from potential impacts associated with contamination.

11.5.15 In addition no discharges from any self-contained wheel wash and localised wheel wash will be permitted to discharge into any surface water system.

Temporary Drainage and Settlement

11.5.16 Temporary drainage facilities will be provided during the construction phase, where necessary, to ensure controlled discharge of surface water runoff.

11.5.17 It will be a contractual requirement of the contractor to ensure that runoff from the Site does not cause pollution or flooding. Measures that will be considered for implementation for temporary drainage through the construction design and/ or the CEMP include:

- installation of measures such as swales, silt fences and appropriately sized settlement tanks/ ponds to reduce sediment load;

- cut-off ditches or geotextile silt-fences, installed around excavations, exposed ground and stockpiles to prevent uncontrolled release of sediments from the Proposed Development;
- Site access points will be regularly cleaned to prevent build-up of dust and mud:
- a valve will be installed to isolate the settlement tank/ ponds in the event of a polluted discharge;
- oil interceptors to be installed (notably the outflow from the settlement pond/ tank) to reduce the potential risk for contamination of groundwater and surface water; and
- all potentially polluted waters (including washdown areas, stockpiles and other areas of risk for water pollution) to have separate drainage and to be tankered away from the Site.

11.5.18 In addition, if monitoring (see below) demonstrates unsatisfactory levels of solids or other pollutants, measures will be implemented (e.g. changes to site drainage and settlement facilities and/or use of flocculants) to control suspended solids or other polluted discharge to watercourses.

Wastewater Generation

11.5.19 A connection to the foul sewer will be needed for sanitary connection from offices/ admin/ welfare facilities. It is possible this connection may also be licensed for discharge of process effluent in abnormal circumstances if required. However, this will depend on the final design of the plant. Foul drainage will either be discharged to the Yorkshire Water waste water treatment plant (adjacent to the Site, to the north of the Proposed Construction Laydown area) or to a septic tank within the Site that will be emptied as required and tankered off site to a waste water treatment plant.

Cofferdams

11.5.20 Two cofferdams will be constructed in the River Aire to divert the flow away from the in-stream construction areas at the cooling water abstraction and discharge points, to allow construction activities to take place safely. Maintaining a dry channel bed in the areas of in-channel working will help to reduce overall channel disturbance and sediment generation.

11.5.21 It is likely the cofferdam will be constructed using steel sheet piles supported by internal braces and cross braces. Construction of the cofferdam will be timed to avoid sensitive times of the year with regards to biodiversity (i.e. avoiding the main salmonid migratory season October to December) and flood risk (i.e. they will be installed during the drier, summer months).

11.5.22 As discussed in Chapter 5: Construction Programme and Management, the cofferdam will be required at the cooling water abstraction point for two periods of approximately three months each, with an intervening period of approximately six months when no in-river works will be required. At the cooling water discharge point, the cofferdam will be required for a continuous period of up to six months. The cofferdams will be designed to minimise changes in riverbed and bank erosion and toe scour over the duration of their use, and the duration of the cofferdams being in place will also be minimised to reduce the potential for erosion and scour impacts (as well as flood risk impacts). At the cooling water abstraction point this may mean installing and removing the cofferdam twice.

11.5.23 Waters removed by dewatering within the cofferdam area will be discharged appropriately, subject to the relevant licences being obtained. Any potentially contaminated water/ sediment will be tested, and if it is not of a suitable quality, agreed disposal procedures will be followed.

11.5.24 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 River).

11.5.25 Silt curtains can be deployed to completely enclose the cofferdam installation and removal works.

11.5.26 Appropriate licences will be obtained from the Environment Agency with regards working within the watercourse (for both the cooling water abstraction and discharge points) and a deemed marine licence is included within the draft DCO (Application Document Ref 2.1) for works at the discharge point.

11.5.27 There are potential risks of bank erosion to residential properties on the northern bank of the River Aire opposite the intake cofferdam, and to agricultural land and flood defence infrastructure (embankment) opposite and adjacent to the outfall cofferdam. The cofferdams might have the effect of locally accelerating and diverting flows into channel banks, but temporary bank protection could mitigate this. Local channel banks would need to be inspected at the same time as the coffer dam, and maintained as necessary.

Flood Risk

11.5.28 The proposed crossings of the River Aire and the Ings and Tetherings Drain lie within Flood Zone 3b – Functional Floodplain. With the likelihood that the River Aire will flood during the duration of the proposed works, the emphasis is placed on managing and mitigating the risks to the proposed temporary works as well as not increasing the flood risk elsewhere.

11.5.29 Construction works undertaken adjacent to, beneath and within watercourses (including the construction of the Proposed Cooling Water and Gas Connections) will comply with relevant guidance during construction, including the Environment Agency PPGs and the requirements of the Selby IDB and Danvm Drainage Commission byelaws, particularly Byelaws 3,6, 10 and 17.

11.5.30 The CEMP prepared in accordance with draft DCO Requirement 20 will incorporate measures aimed at preventing an increase in flood risk during the construction works. Examples of such measures include:

- topsoil and other construction materials will be stored outside of the 1 in 100 year floodplain extent wherever possible and only moved to the temporary works/ cofferdam areas immediately prior to use;
- connectivity will be maintained between the floodplain and the River Aire, with no changes in ground levels within the floodplain;
- the construction laydown area site office and supervisor will be notified of any potential flood occurring by use of the Floodline Warnings Direct service;
- the duration of temporary cofferdams being in place will be reduced where possible to minimise the length of time the channel capacity in the River Aire is reduced. As described in Chapter 5: Construction Programme and Management and above at paragraph 11.5.25, this may mean the multiple installation and removal of cofferdams for in-river works

rather than leaving the structure present within the channel for the total duration of the works (see Chapter 5: Construction Programme and Management);

- appropriate timing of the use of cofferdams to minimise flood risk – for example two cofferdam phases in the summer is preferable to one extended period where the probability of a flood event occurring will be much higher; 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, including the cofferdam areas when in use.

Operation

11.5.31 A number of the impact avoidance measures employed during the construction phase will remain for the operation phases of the development (where relevant), and will be through the site operator's Environmental Management System (EMS), for example:

- plans to deal with accidental pollution and any necessary equipment (e.g. spillage kits) will be held on site and all site personnel will be trained in their use, for example the plan will incorporate details on how to appropriately deal with accidental spillages to ensure they are not drained to any surface water system;
- containment measures will be implemented, including bunding or double-skinned tanks for fuels and oils; all chemicals will be stored in accordance with their COSHH guidelines; and
- interceptors will be incorporated into the drainage system to prevent material entering the surface water drainage system or local waterbodies.

Contaminated Fire Water

11.5.32 In the event of a fire, the surface water drainage system will be closed to prevent contaminated water being released through surface water drains. Fire water will be contained on site and either disposed off-site in accordance with waste management legislation (if contaminated) or discharged to surface water (Hensall Dyke or River Aire) if the water quality is acceptable for surface water discharge (and subject to agreement with the Environment Agency and/ or the Danvm Drainage Commissioners). This strategy will prevent pollution of surface and ground waterbodies.

Abnormal Events

11.5.33 A plan will be developed in order to deal with abnormal events requiring boiler water drain down. The plan will detail where boiler water will be contained on site; options include the oversizing of the process effluent tank and/ or a dedicated separate tank. Water collected in such circumstances will be retained for reuse or taken off site for appropriate disposal.

11.5.34 Similarly, during commissioning of the plant an acid boiler clean will likely be required; contaminated wastewater from this clean will be retained in process tanks and tankered off site for appropriate treatment and disposal.

Site Drainage

11.5.35 An Outline Drainage Strategy has been produced see Appendix 11A (Flood Risk Assessment), Annex 5 in ES Volume III).

11.5.36 The description below represents the strategy for what is proposed to be included as a minimum and will incorporate features such as:

- piped gravity system discharging at a restricted rate to the existing open channel of Hensall Dyke to the south-east of the Proposed Power Plant Site (which has been agreed in principle with Danvm IDB; alternatively surface water could be discharged via the cooling water discharge to the River Aire);
- separate networks for roof drainage and hardstanding areas, with runoff from hardstanding areas passed through oil interceptors, attenuated within the Site prior to discharge to Hensall Dyke (or alternatively the River Aire);
- surface water discharged from the Proposed Development will be restricted to the greenfield runoff rate, approximately 1.4 l/s/ha, via attenuation methods (with an estimated storage volume in the range of 13,700 m^3 and 19,300 m^3 for a 1 in 30 year event) and appropriate flow control device located within the Site boundary;
- other SuDS techniques such as swales, permeable paving and soakaways, to attenuate flow from the Site and maximise infiltration (where appropriate), may be considered at the detailed design stage ;
- for the management of foul water it is proposed that the Proposed Development is connected to either the Yorkshire Water waste water treatment plant on Wand Lane adjacent to the Site or to a septic tank within the Site which would be emptied as required and tankered off site for treatment; and
- silt traps and interceptors will be installed where appropriate.

11.5.37 The details set out in the drainage strategy (Appendix 11A (Flood Risk Assessment) Annex 5 – ES Volume III) represent an outline design and will be developed through detailed design and in response to requirements identified through the detailed design process.

11.5.38 Where surface water drainage to Hensall Dyke is proposed during operation of the Proposed Development (Appendix 11A (Flood Risk Assessment, including an Outline Drainage Strategy as Annex 5) – ES Volume III) consent will be required from the Danvm Drainage Commissioners. If this consent is not granted for any reason, permission to discharge to the River Aire would be sought as part of the Environmental Permit.

11.5.39 Land drainage along the Proposed Gas Connection corridor will remain at greenfield runoff rates and all land drains/ minor watercourses will be reinstated to ensure farmland drains appropriately following construction of the pipeline. A commitment to undertake a study to identify all land drainage features with potential to be affected by the construction of the Proposed Gas Connection pipeline, and measures to ensure they are appropriately reinstated, is included as a Requirement in the draft DCO.

Flood Risk

11.5.40 The Applicant will subscribe to the Environment Agency's Flood Alert Service in the area.

11.5.41 As a precaution, flood resilience measures will be incorporated into the Proposed Development to minimise the amount of damage and reduce the recovery time in the unlikely case of the Site becoming inundated. During construction the opportunity will be taken to adopt flood resilient design techniques for the terrestrial elements of the Proposed Development. The following resilient measures have been identified as possible options for inclusion at this site, subject to final design:

- placement of main plant and flood sensitive equipment above the River Aire 1 in 100 year flood level plus an allowance for climate change (7.65 mAOD);
- finished floor level raised 300 mm above adjacent ground levels, where possible;
- adequate containment of storage areas to ensure material does not wash away and cause pollution;
- flood proofing including the use of flood resistant building materials, use of water resistant coatings, use of galvanised and stainless steel fixings and raising electrical sockets and switches;
- inclusion in the existing Power Station's emergency response procedures including the recommendation of at least one Flood Warden for the Proposed Power Plant Site;
- as a precaution, the AGI, located in Flood Zone 2, will not be visited for maintenance work when a flood warning is in effect on the River Aire;
- implementation of a Surface Water Management Strategy; and
- oil interceptors will be based on guidance within PPG3 (Ref 12-14) and are likely to be Class 1 Full Retention systems.

11.5.42 Further details are included within the FRA presented as Appendix 11A (ES Volume III).

Decommissioning

11.5.43 A detailed Decommissioning Environmental Management Plan will be prepared to identify required measures to prevent pollution during this phase of the development, based on the detailed decommissioning plan.

11.5.44 The impact avoidance measures for decommissioning will be similar to those identified above for construction.

11.6 Likely Impacts and Effects

Construction

11.6.1 The surface watercourses described above (River Aire and Ings and Tetherings Drain, Hensall Dyke, Minor Watercourses and Other Water Features) have been assessed for the likelihood of actual effects occurring as a result of the construction phase of the Proposed Development, as has the groundwater resource below ground.

Contaminated Surface Water Runoff Entering Watercourses, Spillage of Pollutants and Re-suspension of Contaminated Sediments

11.6.2 During construction, there is an elevated risk of leakage or accidental spillage of building materials and potential pollutants used on Site, migrating to nearby surface watercourses or infiltrating to groundwater. Washout facilities (washing of tools, plant and equipment), storage and use of various liquids and soluble solids, unstable exposed soils, excavated materials, stored aggregates, contaminated road surfaces, and fuel storage and handling all have the potential to result in pollution of water resources. Inappropriate disposal of waste materials associated with the construction phase also has the potential to enter surface water.

11.6.3 In-channel works associated with upgrading/ replacing existing infrastructure at the cooling water abstraction and discharge points in the River Aire and the proposed surface water outfall to Hensall Dyke have the potential to disturb sediment on the bed of the watercourse, resulting in the re-suspension of contaminated sediment within the channel. The River Aire is turbid in this area, and flood embankments will trap sediment in the channel that would otherwise be deposited onto the floodplain. As such, baseline sediment concentrations are high, and localised impacts are likely to be trivial and of short duration.

11.6.4 Some construction activities could have the potential to create pathways through the subsurface strata and lead to contamination of the underlying Principal Aquifer. A significant accidental discharge of fuel, for example, or a toxic substance would be detrimental to surface water and groundwater receptors and attributes.

11.6.5 Contaminated material exposed or disturbed during the construction works has the potential to affect surface water or groundwater (as discussed in Chapter 12: Geology, Hydrogeology and Land Contamination). As described, there is not a significant risk of impact from contaminated material on surface water and groundwater receptors after the implementation of impact avoidance measures. Details are provided in Chapter 12: Geology, Hydrogeology and Land Contamination which should be referred to for further information.

11.6.6 With the measures set out in the Impact Avoidance section above (including the implementation of a CEMP and the use of cofferdams to provide 'dry' in-channel working), the likelihood of such an event occurring is low. Taking this into account, and based on the information available to date, the anticipated potential effects on different attributes are described below.

River Aire

11.6.7 Potential contamination impacts and effects on the River Aire are assessed below.

- water quality and WFD status (high importance) -
    - possibility of a measurable but highly localised and temporary change in water quality, assuming a very worst case scenario (this conclusion is reached having consideration to the dilution potential of the River and its current quality). The potential impact is evaluated to be of low magnitude, and whilst effects might be experienced in the localised area, no effect on the quality of the River and WFD status would be experienced with the implementation of the impact avoidance measures,

- this effect is therefore considered to be **minor adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented);

- water supply (very high importance) –

  - there exists the potential for a localised temporary impact on water supply, but given the localised nature and the level of dilution provided within the River itself, the potential impact is evaluated to be of low magnitude on the River Aire,
  - the resulting effect would be **minor adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented);

- recreation (high importance) -

  - there exists the potential for a localised temporary impact on recreational activity such as walking, recreational fishing and river navigation, but given the localised nature, such an impact is evaluated to be of low magnitude as a worst case scenario,
  - the resulting effect would be **minor adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and

- biodiversity (high importance) -

  - there is the possibility of a highly localised effect on water quality that could potentially have a temporary and localised ecological impact, however the impact and effect would be constrained to the area immediately adjacent to the Site (fish, invertebrates etc. being affected from the changes to water quality) and the impact is evaluated to be of very low magnitude due to high level of dilution,
  - the significance of this effect is therefore considered to be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented).

Ings and Tetherings Drain

11.6.8 Potential contamination impacts and effects on Ings and Tetherings Drain are assessed below.

- water quality and WFD status (high importance) -

  - possibility of a measurable but highly localised and temporary change in water quality, assuming a very worst case scenario (this conclusion is reached having consideration to the dilution potential of the Drain and its current quality). The potential impact is evaluated to be of low magnitude, and whilst effects might be experienced in the localised area, no effect on the quality of the Drain and WFD status would be experienced with the implementation of the impact avoidance measures,
  - this effect is therefore considered to be **minor adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented);

- recreation (low importance) -

  - there exists the potential for a localised temporary impact on recreational activity such as walking, but given the localised nature, such an impact is evaluated to be of low magnitude as a worst case scenario,

- the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and

- biodiversity (high importance) -

  - there is the possibility of a highly localised effect on water quality that could potentially have a temporary and localised ecological impact, however the impact and effect would be constrained to the area immediately adjacent to the Site (fish, invertebrates etc. being affected from the changes to water quality) and the impact is evaluated to be of low magnitude due to the moderate level of dilution,
  - the significance of this effect is therefore considered to be **minor adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented).

Hensall Dyke

11.6.9 Potential contamination impacts and effects on Hensall Dyke are assessed below.

- water quality (medium importance) -

  - possibility of a measurable but highly localised and temporary change in water quality, assuming a very worst case scenario (this conclusion is reached having consideration to the dilution potential of the Dyke and its current quality). The potential impact is evaluated to be of low magnitude, and whilst effects might be experienced in the localised area, no effect on the quality of the Dyke would be experienced with the implementation of the impact avoidance measures,
  - the significance of this effect is therefore considered to be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented);

- recreation (low importance) -

  - there exists the potential for a localised temporary impact on recreational activity such as walking, but given the localised nature, such an impact is evaluated to be of low magnitude as a worst case scenario,
  - the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and

- biodiversity (low importance) -

  - possible localised and temporary ecological impact resulting from the effect on water quality, impact of very low magnitude,
  - this would have a temporary **negligible adverse (not significant)** effect (but is unlikely to occur based on impact avoidance measures to be implemented).

Minor Watercourses/ Drainage Ditches

11.6.10 Potential contamination impacts and effects on minor watercourses and drainage ditches are assessed below.

- water quality (low importance) -
    - possible measurable but highly localised and temporary change in water quality, assuming a very worst case scenario, however the likelihood is considered very low due to the ephemeral nature of the watercourses. The potential impact is evaluated to be of low magnitude, and whilst effects might be experienced in the localised area, no effect on the quality of the watercourses would be experienced with the implementation of the impact avoidance measures,
    - the significance of this effect is therefore considered to be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented).

- recreation (low importance) -
    - there exists the potential for a localised temporary impact on recreational activity such as walking, but given the localised nature, such an impact is evaluated to be of low magnitude as a worst case scenario,
    - the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and

- biodiversity (low importance) -
    - possible localised and temporary ecological impact resulting from the effect on water quality, impact of very low magnitude,
    - this would have a temporary **negligible adverse (not significant)** effect (but is unlikely to occur based on impact avoidance measures to be implemented).

Other Surface Water Features

11.6.11 Potential contamination impacts and effects other surface water features are assessed below.

- water quality (low importance) -
    - possible highly localised and temporary change in water quality, assuming a very worst case scenario, impact of very low magnitude,
    - this would have a temporary **negligible adverse (not significant)** effect (but is unlikely to occur based on impact avoidance measures to be implemented).

- recreation (low importance) -
    - there exists the potential for a localised temporary impact on recreational activity, an impact of very low magnitude as a worst case scenario,
    - the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and

- biodiversity (low importance) –

    - possible localised and temporary ecological impact resulting from the effect on water quality, impact of very low magnitude,
    - this would have a temporary **negligible adverse (not significant)** effect (but is unlikely to occur based on impact avoidance measures to be implemented).

Surface Water – Suspended Sediments in Site Runoff/ Re-suspension of Sediments in Watercourses

11.6.12 The movement and storage of construction and waste materials to and from the Site, and from other construction activities has the potential to give rise to suspended solids that could become entrained in surface water run-off from the Site following rainfall. This creates a potential risk of increased sediment loads being discharged into the nearby surface water.

11.6.13 In-channel works associated with upgrading/ replacing existing infrastructure at the cooling water abstraction and discharge points in the River Aire and the proposed surface water outfall to Hensall Dyke have the potential to disturb sediment on the bed and banks of the watercourse resulting in the re-suspension of sediment within the channel.

11.6.14 High sediment input has the potential to affect waterbodies by increasing turbidity, reducing dissolved oxygen (DO) levels and reducing light penetration. There could also be toxic effects caused by inorganic and organic compounds associated with suspended sediment. Indirect effects could include impacts on invertebrates and fish communities, and destruction of feeding areas, refuges and both breeding and spawning grounds. This can be a particular risk upstream of weirs, where channel gradients and flows are reduced, and sediment can be stored. This has the potential to concentrate contaminants, and for the degradation of the DO of sediment and interstitial water by chemical and biological oxygen demand. Plumes of pollutants or depleted DO released by construction or other activities may be confined upstream of the weir and may not disperse quickly.

11.6.15 Water in these lowland reaches of the River Aire is turbid with suspended sediment, and the flow is generally slack within the reach at the Site due to the naturally low gradient and the existing weir. The River Aire waterbody adjacent to the proposed works currently has mitigation measures set under the WFD with regards to the strategic management of sediment, bank rehabilitation, a reduction in the impact of dredging and sediment suspension.

11.6.16 With the measures set out in the Impact Avoidance section above (including the implementation of a CEMP and the use of cofferdams to provide 'dry' in-channel working), however, the likelihood of this occurring will be very low. Taking this into account, the following effects on different attributes are described below.

River Aire

11.6.17 Potential impacts and effects on the River Aire from suspended and/ or re-suspended sediments are assessed below.

- water quality and WFD status (high importance) -

    - possible localised and temporary changes in water quality, no effect on water quality and WFD status would be experienced, impact of very low magnitude,

- this effect is therefore considered to be **negligible adverse (not significant)**;

- water supply (very high importance)

  - there exists the potential for a localised temporary impact on water supply, but given the localised nature and the level of dilution provided within the River itself, the potential impact is evaluated to be of very low magnitude on the River Aire,
  - the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and

- recreation (high importance) -

  - there exists the potential for a localised temporary impact on recreational activity, but given the localised nature, such an impact is evaluated to be of very low magnitude as a worst case scenario,
  - the resulting effect would be **negligible adverse (not significant)**; and

- biodiversity (high importance) -

  - it is possible that the River Aire could experience a localised and temporary impact with the potential to affect ecology (fish, invertebrates etc., resulting from a change in water quality). Considering a worst case scenario, this impact is evaluated to result in an impact of very low magnitude in the localised area immediately adjacent to the Site,
  - this effect is therefore considered to be **negligible adverse (not significant)**.

Ings and Tetherings Drain

11.6.18 Potential impacts and effects on Ings and Tetherings Drain from suspended and/ or re-suspended sediments are assessed below.

- water quality and WFD status (high importance) -

  - possible localised and temporary changes in water quality, no effect on water quality and WFD status would be experienced, impact of low magnitude,
  - this effect is therefore considered to be **minor adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented);

- recreation (low importance) -

  - there exists the potential for a localised temporary impact on recreational activity such as walking, but given the localised nature, such an impact is evaluated to be of low magnitude as a worst case scenario,
  - the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and

- biodiversity (high importance) -

  - possible localised and temporary changes in water quality, no effect on water quality and WFD status would be experienced, impact of low magnitude,

- this effect is therefore considered to be **minor adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented).

Hensall Dyke

11.6.19 Potential impacts and effects on Hensall Dyke from suspended and/ or re-suspended sediments are assessed below.

- water quality (medium importance) -
  - possible localised and temporary changes in water quality, no effect on water quality would be experienced, impact of low magnitude,
  - this effect is therefore considered to be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented);
- recreation (low importance) -
  - there exists the potential for a localised temporary impact on recreational activity such as walking, but given the localised nature, such an impact is evaluated to be of low magnitude as a worst case scenario,
  - the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and
- biodiversity (low importance) -
  - possible localised and temporary ecological impact resulting from the effect on water quality, impact of very low magnitude,
  - this would have a temporary **negligible adverse (not significant)** effect (but is unlikely to occur based on impact avoidance measures to be implemented).

Minor Watercourses/ Drainage Ditches

11.6.20 Potential impacts and effects on minor watercourses and drainage ditches from suspended and/ or re-suspended sediments are assessed below.

- water quality (low importance) -
  - possible localised and temporary changes in water quality, no effect on water quality status would be experienced, impact of low magnitude,
  - this effect is therefore considered to be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented).
- recreation (low importance) -
  - there exists the potential for a localised temporary impact on recreational activity such as walking, but given the localised nature, such an impact is evaluated to be of low magnitude as a worst case scenario,
  - the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and

- biodiversity (low importance) -

    - possible localised and temporary ecological impact resulting from the effect on water quality, impact of very low magnitude,
    - this would have a temporary **negligible adverse (not significant)** effect (but is unlikely to occur based on impact avoidance measures to be implemented).

Other Surface Water Features

11.6.21 Potential impacts and effects on other surface watercourses from suspended and/ or re-suspended sediments are assessed below.

- water quality (low importance) -

    - possible highly localised and temporary change in water quality, assuming a very worst case scenario, impact of very low magnitude,
    - this would have a temporary **negligible adverse (not significant)** effect (but is unlikely to occur based on impact avoidance measures to be implemented).

- recreation (low importance) -

    - there exists the potential for a localised temporary impact on recreational activity, an impact of very low magnitude as a worst case scenario,
    - the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and

- biodiversity (low importance) –

    - possible localised and temporary ecological impact resulting from the effect on water quality, impact of very low magnitude,
    - this would have a temporary **negligible adverse (not significant)** effect (but is unlikely to occur based on impact avoidance measures to be implemented).

<u>Disturbance of Contaminated Materials</u>

11.6.22 Contaminated material exposed or disturbed during the construction works has the potential to affect surface water or groundwater (as discussed in Chapter 12: Geology, Hydrogeology and Land Contamination). As described, there is not a significant risk of impact from contaminated material on surface water and groundwater receptors after the implementation of defined impact avoidance measures. Therefore the significance of this effect is assessed as **negligible adverse (not significant)**. Details are provided in Chapter 12: Geology, Hydrogeology and Land Contamination, which should be referred to for further information.

<u>Loss of Existing Lagoon</u>

11.6.23 The existing lagoon is anticipated to be lost during the construction phase due to the need for this area for construction laydown space, and the ultimate severing of any supply to the pond when the new surface water drainage system for the Proposed Development is installed.

11.6.24 The lagoon is considered to be of low importance, and therefore the loss of this feature would be expected to have of **negligible adverse** effect **(not significant)**. This is considered further in Chapter 10: Ecology and Nature Conservation.

Groundwater – Accidental Leakage or Spillage of Pollutants

11.6.25 As discussed in relation to impacts on surface water, during the construction phase there is a low risk of leakage or accidental spillage of potential pollutants used during construction, which may then migrate to underlying groundwater (though the impact avoidance measures set out above will minimise the risk).

11.6.26 The Site is underlain by superficial deposits that are classed, predominantly, as a Secondary A Aquifer with soils having a high leaching potential. The superficial deposits will provide limited protection to the Principal Aquifer below however, measures included in Chapter 12: Geology, Hydrogeology and Land Contamination and in the impact avoidance section above will act to prevent such an incident from occurring, and therefore it is assumed the impact from an event would be of low magnitude and the significance of effect is assessed as **minor adverse (not significant)** (but unlikely to occur) to the Principal Aquifer.

11.6.27 The impact on the water quality and quantity of the perched groundwater (Secondary A Aquifer of medium importance) would potentially be of moderate magnitude, although some attenuation of pollutants would occur in the superficial deposits, and there would be a **negligible adverse (not significant)** effect on the attribute. This is based on the poor quality of the Secondary A Aquifer (superficial aquifer of low importance based on it being an attribute of low quality).

Flood Risk

11.6.28 The use of cofferdams to create dry working areas within the channel of the River Aire adjacent to the cooling water abstraction and discharge points will result in localised reductions in channel capacity. This reduction in channel capacity has the potential to increase flood risk to the area local to the working areas and upstream of the working areas. This increase in flood risk is likely to occur during lower return period events (Appendix 11A FRA provided in ES Volume III). With the measures set out in the Impact Avoidance section above (including the timings and duration of cofferdam use) potential impacts and effects on flood risk would comprise highly localised and temporary changes in flood water levels, assuming a worst case scenario, potentially causing an impact of low magnitude. This could have a temporary, short term **moderate adverse (significant)** effect.

11.6.29 During higher return period flood events it is likely that the cofferdam would overtop and fill with flood water (Appendix 11A FRA provided in ES Volume III). In addition, given the extensive nature of the 1 in 100 year flood extent at Eggborough, any increase in flood risk both to the Site and the local area is likely to be **negligible adverse (not significant)**.

11.6.30 Flow constrictions created by the cofferdams have the potential to locally accelerate and divert flows against the channel banks, which could cause local scour of the channel bed and banks. Bed scour is unlikely to be significant, since in a meandering river, bed levels will vary locally, and any scour holes would in-fill with natural bed movement, making the effect **negligible adverse (not significant)**.

11.6.31 Bank erosion is a potentially greater risk, particularly to residential properties on the northern bank of the River Aire opposite the abstraction point. The risk receptors at the discharge point are not residential, but there is still potential for local impacts on agricultural land and flood defence infrastructure (embankment). However, with the proposed impact avoidance measures that will be implemented (short-duration phases of cofferdam installation in seasonal low flows, when vegetation cover would naturally protect against erosion), any potential impacts are likely to be avoided. If a high flow event coincides with a period when a cofferdam is in place, an impact is possible, but given the low risk the effect is considered to be **minor adverse (not significant)**.

Operation

11.6.32 Once the Proposed Development is open and operational it is considered that the majority of identified watercourses assessed during the construction phase will not be affected by the development.

11.6.33 Only the River Aire, Hensall Dyke, and the Minor Watercourses located in the vicinity of the AGI have been assessed for the likelihood of actual effects occurring as a result of the operational phase of the Proposed Development, as has the groundwater resource below ground.

11.6.34 The Proposed Development will continue to utilise the River Aire in terms of abstraction/ discharge of cooling water (as the existing coal-fired power station does) whilst Hensall Dyke is proposed to receive surface water drainage from the Proposed Power Plant Site and Proposed CCR Area.

Surface Water – Leakage from Drainage System

11.6.35 An Outline Drainage Strategy has been developed for the Proposed Development, as detailed in Appendix 11A (Flood Risk Assessment, Annex 5 – ES Volume III).

11.6.36 The proposed drainage system will be been designed to ensure any polluting waste is discharged directly to a foul sewer and that any uncontaminated surface water is discharged directly to Hensall Dyke at greenfield rates via attenuation methods. Whilst pollution prevention features will be included in the design as set-out in the Impact Avoidance section above, there always remains the potential for leakage from the system to occur (albeit the risk is very low).

11.6.37 The effects of any accidental pollution from foul drainage on different attributes of the identified watercourses will be as set out below for each water body.

Hensall Dyke

11.6.38 Potential impacts and effects on Hensall Dyke from any leakage from the drainage system are assessed below.

- water quality (medium importance) -
    - possible localised and temporary changes in water quality, no effect on water quality would be experienced, impact of low magnitude,

- this effect is therefore considered to be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented);

- recreation (low importance) -

  - there exists the potential for a localised temporary impact on recreational activity such as walking, but given the localised nature, such an impact is evaluated to be of low magnitude as a worst case scenario,
  - the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and

- biodiversity (low importance) -

  - possible localised and temporary ecological impact resulting from the effect on water quality, impact of very low magnitude,
  - this would have a temporary **negligible adverse (not significant)** effect (but is unlikely to occur based on impact avoidance measures to be implemented).

Minor Watercourses/ Drainage Ditches

11.6.39 Potential impacts and effects on minor watercourses and drainage ditches from any leakage from the drainage system are assessed below.

- water quality (low importance) -

  - possible localised and temporary changes in water quality, no effect on water quality status would be experienced, impact of low magnitude,
  - the significance of this effect is therefore considered to be negligible adverse (and unlikely to occur based on the impact avoidance measures to be implemented).

- recreation (low importance) -

  - there exists the potential for a localised temporary impact on recreational activity such as walking, but given the localised nature, such an impact is evaluated to be of low magnitude as a worst case scenario,
  - the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and

- biodiversity (low importance) -

  - possible localised and temporary ecological impact resulting from the effect on water quality, impact of very low magnitude,
  - this would have a temporary **negligible adverse (not significant)** effect (but is unlikely to occur based on impact avoidance measures to be implemented).

<u>Surface Water – Contamination of Site Runoff</u>

11.6.40 The impacts associated with contamination of surface water (with sediments, fuels etc.) are considered to be the same as those assessed in relation to leakage from the drainage system, as any potentially polluting substances would be stored inside buildings as set out below.

Implementation of the Impact Avoidance measures as described above will ensure the risk of contamination of site runoff is low.

11.6.41 The potential effects of pollution from contaminated surface runoff will be as set out below for each water body.

Hensall Dyke

11.6.42 Potential impacts and effects on Hensall Dyke from contaminated runoff are assessed below.

- water quality (medium importance) -
    - any contaminated run off is likely to infiltrate into the surface layers or pond on the surface, allowing clean up, prior to reaching the watercourse. The surface drainage system will be designed with attenuation features that have the potential to capture any contaminated runoff for treatment. If, however, a spillage of pollutant did reach Hensall Dyke, or a leak occurred in the foul drainage system, considering the importance of the attribute, the potential impact would be localised, temporary and of low magnitude,
    - the significance of this effect is therefore considered to be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented);

- recreation (low importance) -
    - there exists the potential for a localised temporary impact on recreational activity such as walking, but given the localised nature, such an impact is evaluated to be of low magnitude as a worst case scenario,
    - the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and

- biodiversity (low importance) -
    - possible localised and temporary ecological impact resulting from the effect on water quality, impact of very low magnitude,
    - this would have a temporary **negligible adverse (not significant)** effect (but is unlikely to occur based on impact avoidance measures to be implemented).

Minor Watercourses/ Drainage Ditches

11.6.43 Potential impacts and effects on minor watercourses and drainage ditches from contaminated runoff are assessed below.

- water quality (low importance) -
    - possible localised and temporary changes in water quality, no effect on water quality status would be experienced, impact of low magnitude,
    - the significance of this effect is therefore considered to be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented).

- recreation (low importance) -
    - there exists the potential for a localised temporary impact on recreational activity such as walking, but given the localised nature, such an impact is evaluated to be of low magnitude as a worst case scenario,
    - the resulting effect would be **negligible adverse (not significant)** (and unlikely to occur based on the impact avoidance measures to be implemented); and
- biodiversity (low importance) -
    - possible localised and temporary ecological impact resulting from the effect on water quality, impact of very low magnitude,
    - this would have a temporary **negligible adverse (not significant)** effect (but is unlikely to occur based on impact avoidance measures to be implemented).

Drainage and Flow to Surface Water and Ground Waters

11.6.44 The changes to drainage have the potential to alter the discharge rates from the Site and thus flow dynamics within adjacent watercourses (increase in spate flows, scouring of the stream bed, etc.), along with increasing infiltration to groundwater and therefore recharge of the aquifer. Surface water discharge will be restricted to greenfield runoff rates and discharge to watercourses in line with local IDB byelaws, therefore effects on surrounding waterbodies, such as Hensall Dyke, would be minimal.

11.6.45 Although the detailed drainage design will not be completed until the detailed design stage, drainage will follow the existing site catchment and outfall routes to surface watercourses and will be designed so as not to increase flood risk. These measures allow the design criterion of no flooding during a 1 in a 30 year plus climate change storm to be achieved.

11.6.46 The volumes of the proposed cooling water abstraction and discharge to the River Aire for the Proposed Development will be lower than for the existing coal-fired power station and the discharge is anticipated to be subject to the same restrictions on quality (via the Environmental Permit), so **no adverse effects** are anticipated.

11.6.47 The temperature of the proposed cooling water discharge to the River Aire for the Proposed Development will be similar to that currently entering the River from the existing coal fired power station (i.e. the current baseline). The likely effects of temperature on biodiversity are discussed within Chapter 10: Ecology and Nature Conservation, however, **no adverse effects** are anticipated on water quality or other associated attributes of the River Aire.

Flood Risk

11.6.48 The FRA for the Proposed Development, included within Appendix 11A (ES Volume III), concludes that development of the Site will not increase the risk of flooding from fluvial, groundwater or overland flow sources.

11.6.49 An Outline Drainage Strategy has been developed for the Site and is presented as Appendix 11A (Flood Risk Assessment, Annex 5 – ES Volume III). As detailed in the Outline Drainage Strategy surface water discharged from the Proposed Development will be restricted to the existing greenfield runoff rate via attenuation methods and an appropriate flow control device located within the Site boundary.

11.6.50 Design of the surface water network will be based on the following design rainfall return periods and criteria:

- no surcharging of the network for a 1 in 2 year return period/ peak discharge rate restricted to equivalent greenfield rate;
- no flooding of the network for a 1 in 30 year return period/ peak discharge rate restricted to equivalent greenfield; and
- no flooding off site for a 1 in 100 year return period/ peak discharge rate restricted to equivalent greenfield rate/ any flooding to be assessed to determine overland flow routes.

11.6.51 Based on the preliminary proposed catchment areas and allowable discharge rates a storm water attenuation volume in the range of 13,700 m^3 and 19,300 m^3 for a 1 in 30 year event is estimated to be required for 1 in 30 year storm event with a 30% climate change allowance.

11.6.52 The Site will be assessed as part of the detailed drainage design to consider the risk posed by any flooding up to and beyond the 1% (1 in 100 year) flood event. Any flooding will be diverted away from critical infrastructure or access routes and retained on the Site wherever possible.

11.6.53 Other SuDs techniques such as swales, permeable paving and soakaways may be considered at the detailed design stage.

11.6.54 The Outline Drainage Strategy is fully compliant with the requirements of the NPPF, local policy and the recommendations of the Environment Agency and Lead Local Flood Authority (NYCC) and the relevant IDBs.

Groundwater

11.6.55 Once the Proposed Development is operational, the probability of any operational activity occurring that would affect groundwater is low. There is, however, the potential for leakage or accidental spillage of potential pollutants (e.g. diesel fuel stored on site or vehicle washing) that may migrate to the underlying groundwater. The Environmental Permit will contain a condition to prevent any contamination of land or groundwater during the operational phase of the Proposed Development.

11.6.56 Unless a direct pathway to the underlying Principal Aquifer is created in the construction phase (and it is assumed that impact avoidance measures incorporated into the design will prevent this from occurring) then it is considered highly unlikely that any contaminant would reach the Principal Aquifer during site operation and therefore the effect on the Principal Aquifer would be **negligible adverse (not significant)**.

11.6.57 The effect of a spillage on the superficial deposits (Secondary A Aquifer) could cause a measurable but localised temporary change in groundwater quality (impact of low magnitude). Given the medium importance of this attribute, the effect on the superficial aquifer would be **negligible adverse (not significant)**.

Decommissioning

11.6.58 Decommissioning of the Proposed Development will see the removal of all above ground structures down to ground level such that the site is cleared with only areas of hardstanding remaining.

11.6.59 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.

11.6.60 On this basis, decommissioning impacts are expected to be limited to watercourses/ groundwater bodies in close proximity to the Proposed Power Plant Site and the AGI (Hensall Dyke and Minor watercourses) and will be the same as construction impacts, as discussed above.

Summary of Potential Impacts on WFD Status

11.6.61 The WFD status of the River Aire and Ings and Tetherings Drain has been considered for each of the potential impacts described as part of this assessment.

11.6.62 Given the nature of the impacts (notably that they are largely of temporary nature and/or unlikely to affect the WFD elements), and assuming the measures included in the Impact Avoidance section are effectively implemented, there will be **no effect** on WFD status and objectives.

11.6.63 Mitigation measures already in place on the River Aire (including Ings and Tetherings Drain) include the strategic management of sediment, bank rehabilitation, reducing impact of dredging and reducing sediment suspension.

11.6.64 Proposed WFD mitigation measures as included within the Humber RBMP include the preservation of marginal aquatic habitat, banks and the riparian zone, improving floodplain connectivity, appropriate vegetation control, set back and the removal of obsolete structures.

11.6.65 The Proposed Development is unlikely to significantly impact upon the ability of these mitigation measures to be implemented and for the current mitigation measures to remain. The effect on the WFD status of both the River Aire and the Ings and Tetherings Drain is therefore likely to be **negligible adverse (not significant)**.

11.7 Mitigation and Enhancement Measures

11.7.1 A number of legislative and best practice measures which will be followed during the construction, opening and operation and decommissioning of the Proposed Development are detailed in the Development Design and Impact Avoidance section. The design and impact avoidance measures have been taken into account in the assessment and no additional mitigation requirements have been identified.

11.8 Residual Effects

11.8.1 As no mitigation measures additional to those described within the Development Design and Impact Avoidance section have been identified, the residual effects remain as described in the Likely Impacts and Effects section above. It is acknowledged that even with the implementation of impact avoidance measures, there is still a very limited potential for some residual risk to the water environment associated with the construction and operation of the Proposed Development.

11.8.2 The only significant effect identified in Section 11.6 above is a potential effect on flood risk as a consequence of the short term use of cofferdams, which has been assessed as potentially moderate adverse (significant). This potential effect would only occur during lower return

period flood events and would be temporary and short term during the short periods of time during the construction phase when the cofferdams will be in place (two three month periods for the water intake point and one up to six month period at the cooling water discharge point, during times where the probability of a high return period event occurring is low).

11.9 Limitations or Difficulties

11.9.1 The analyses and conclusions presented in this chapter are based on the data available at the time of publication of this document. Specifically the assessment has drawn on information contained within baseline surveys carried out in relation to the Proposed Development, and readily available baseline information.

11.10 Conclusions

11.10.1 This chapter assesses potential impacts from the Proposed Development on the quality and quantity of groundwater and surface waterbodies, and the effects of these potential changes on key receptors (or attributes). Water features that could potentially be affected include the River Aire and Ings and Tetherings Drain, Hensall Dyke, minor watercourses and drainage ditches, other identified water features and groundwater.

11.10.2 The standard impact avoidance measures proposed will reduce the risk of many impacts occurring during the construction, operational and decommissioning phases. These include implementation of Environment Agency PPGs, construction staff awareness and training, implementation of pollution plans and the appropriate discharge/ disposal of site runoff.

11.10.3 The assessment has identified the 'worst case scenario', such as significant pollution events, which have a low probability of occurrence due to the procedures and measures that will be put in place.

11.10.4 The majority of the adverse residual effects on the key receptors have been assessed as minor adverse to negligible adverse and therefore not significant. The exception to this is flood risk (as a consequence of the short term use of cofferdams) which has been assessed as potentially moderate adverse (significant). This potential effect would only during lower return period flood events and would be temporary and short term during the short periods of time during the construction phase when the cofferdams will be in place (two three month periods for the water intake point and one up to six month period at the cooling water discharge point, during times where the probability of a high return period event occurring is low).

11.10.5 Adverse residual effects on the key receptors have been assessed as minor adverse to negligible adverse and therefore not significant for the operational and decommissioning phases.

11.10.6 The FRA (Appendix 11A – ES Volume III) concludes that development of the Site will not increase the risk of flooding from drainage infrastructure, artificial, groundwater or surface water sources. It is considered that any increase in fluvial flood risk as a result of the Proposed Development (predominantly as a consequence of the temporary use of cofferdams within the River Aire channel) will be minimal and restricted to the construction period only when the cofferdams are use.

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