Tables

12. Flood Risk, Hydrology and Water Resources

12.1 Introduction

12.1.1 This chapter of the Environmental Statement (ES) addresses the potential effects of the construction, operation (including maintenance) and decommissioning of the proposed WBC gas fired generating station on the site of the West Burton Power Station (the Proposed Development) on flood risk and water resources. The assessment considers:

- the present-day and future baseline conditions during construction and at opening;
- the effects of construction of the Proposed Development on water resources, flood risk and drainage;
- the effects of operation of the Proposed Development on water resources, flood risk and drainage; and
- the potential effects of the eventual decommissioning of the Proposed Development.

12.1.2 The assessment of cumulative effects on water resources, flood risk and drainage associated with the Proposed Development and other committed developments in the vicinity are described in **Chapter 16:** Cumulative and Combined Effects.

12.1.3 This chapter is supported by **Appendix 12A:** Flood Risk Assessment (FRA) (ES Volume II), and an Outline Drainage Strategy (**Application Document Ref. 7.8**). The FRA details the existing levels of flood risk associated with the Site and the surrounding area, quantifies the volume of surface water on the Site and requiring management, identifies the impacts that the Proposed Development would have upon these aspects, and outlines potential mitigation measures to reduce the impact and manage the flood risk.

12.1.4 The Outline Drainage Strategy for the Proposed Development (**Application Document Ref. 7.8**) provides guidance and information with regards to the effective and safe drainage of surface water for the Site. The final drainage design would be completed during the detailed design stage.

12.1.5 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 11**: Ground Conditions and Hydrogeology, due to the considerable overlap between the two subject areas.

12.2 Legislation, Planning Policy and Guidance

Legislative Background

European Legislation

12.2.1 The European Union (EU) Water Framework Directive (WFD) (2000/60/EC) (Ref 12-1) 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.

12.2.2 The WFD 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

12.2.3 The Water Resources Act 1991 (as amended) (Ref 12-2) sets out the relevant regulatory controls that provide protection to waterbodies and water resources (from abstraction pressures and pollution).

12.2.4 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) (Ref 12-3) – see paragraph 12.2.6 and paragraph 12.2.7;
- The Water Act 2003 (Ref 12-4) and 2014 (Ref 12-5) governing the control of water abstraction, discharge to water bodies, water impoundment, conservation and drought provision;
- The Environment Act 1995 (Ref 12-6) which established the Environment Agency and its statutory role in water resource protection;
- The Environmental Protection Act 1990 (Ref 12-7) which provides for integrated pollution control; and
- The Land Drainage Act 1991 (Ref 12-8) which provides for drainage management related to non-main rivers.

12.2.5 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 (Ref 12-9). 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 Water Environment (WFD) Regulations 2015 (Ref 12-10);
- The Water Framework Directive (Standards and Classification) Directions 2015 (Ref 12-11);
- The Anti-Pollution Works Regulations 1999 (Ref 12-12);
- The Control of Pollution (Oil Storage) (England) Regulations 2001 (Ref 12-13);
- The Environmental Damage Regulations 2009 (Ref 12-14);
- The Flood Risk Regulations 2009 (Ref 12-15);
- The Water Resources Act (Amendment) (England and Wales) Regulations 2009 (Ref 12-16);
- The Environmental Permitting (England and Wales) Regulations 2016 (Ref 12-17), which implement Council Directive 2014/80/EU amending Annex II to Directive 2006/118/EC on the protection of groundwater against pollution and deterioration (Ref 12-18) control discharge of water to surface water and groundwater; and
- The Water Supply (Water Quality) Regulations 2010 (Ref 12-19).

12.2.6 The FWMA, enacted by Government in 2010 in response to The Pitt Review (Ref 12-20) designated unitary authorities, such as Nottinghamshire County Council (NCC), as Lead Local Flood Authorities (LLFAs). As a LLFA, NCC 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).

12.2.7 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.

Planning Policy Context

National Planning Policy

12.2.8 The Overarching National Policy Statement (NPS) for Energy (EN-1) Section 5.7 (Flood Risk) (Ref 12-21) 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.

12.2.9 According to the Environment Agency (EA) Flood Zone Map, land within Flood Zone 1 is land classed as having a less than 1 in 1000 Annual Exceedance Probability (AEP) of fluvial or tidal flooding (<0.1% AEP) in any year. Land within

Flood Zones 2 and 3 are respectively defined as having between a 1 in 100 and 1 in 1000 AEP and more than 1 in 100 AEP chance of flooding in any year.

12.2.10 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.

12.2.11 In determining an application for development consent, the Secretary of State should be satisfied that where relevant:

- the application is supported by an appropriate FRA;
- the Sequential Test has been applied 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.

12.2.12 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.

12.2.13 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 (CAMS));
- 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 waterbodies or protected areas under the WFD and source protection zones (SPZs) around potable groundwater abstractions.

12.2.14 NPS EN-2 (Ref 12-22) on Fossil Fuel Electricity Generating Infrastructure 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.

12.2.15 **Table 12-1** provides a summary of relevant NPS advice regarding water quality and resources, including signposting to where matters are addressed in this chapter.

Table 12-1: Summary of NPS advice on Water Resources

Summary of NPS	Consideration within the Chapter
NPS EN-1	
Paragraph 5.15.2 states*: "Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent."*	This chapter (**Chapter 12**) of the ES considers the existing status of, and impacts of the Proposed Development on water quality, water resources and physical characteristics of the water environment.
Paragraph 5.15.3 states: *"The ES should in particular describe:* • *the existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges;* • *existing water resources affected by the proposed project and the impacts of 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."*	Baseline conditions describing the existing quality of waters (including discharges), water resources (including abstractions), and existing physical characteristics of the water environment have been presented in **Section 12.5**. The likely impacts and effects of the Proposed Development are assessed in **Section 12.7**

Summary of NPS	Consideration within the Chapter
NPS EN-2	
Paragraph 2.10.2 states: "*Where the project is likely to have effects on water quality or resources the applicant should undertake an assessment as required in EN-1 Section 5.15. The assessment should particularly demonstrate that appropriate measures will be put in place to avoid or minimise adverse impacts of abstraction and discharge of cooling.*"	This chapter (**Chapter 12**) of the ES considers the existing status of, and impacts of the Proposed Development on water quality, water resources and physical characteristics of the water environment. No additional abstraction or discharge of cooling water is required therefore this element has not been included within the Chapter. Mitigation of construction, operational and decommissioning impacts is discussed in **Section 12.6**.

12.2.16 The revised National Planning Policy Framework (NPPF) (Ref 12-23) was published in February 2019, replacing earlier versions published in July 2018 and March 2012 and outlines the Government's economic, environmental and social planning policies for England.

12.2.17 On 6th March 2014 the National Planning Practice Guidance (NPPG) web-based resource was launched (Ref 12-24) which includes greater emphasis on issuing more robust guidance with regards to flood risk. The purpose of this online national planning guidance is to give simplicity and clarity to the planning system.

12.2.18 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.

12.2.19 The Non-statutory Technical Standards for Sustainable Drainage Systems (Ref 12-25) was published in March 2015 and is the current guidance for the design, maintenance and operation of 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.

12.2.20 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.

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

Local Development Plan Policy

12.2.22 The Core Strategy and Development Management Policies DPD (Ref 12-26) was adopted by Bassetlaw District Council (BDC) in December 2011 and forms part of its Local Plan. The Core Strategy is the key Local Development Framework document that sets out a vision for change in Bassetlaw along with the place-specific policy approaches to be taken in order to achieve this vision over a period of 18 years. A small number of more detailed development management policies, are also included. Relevant district wide policies include:

- Policy DM10: Renewable and Low Carbon Energy:

'The Council will be supportive of proposals that seek to utilise renewable and low carbon energy to minimise CO2 emissions. Proposal for renewable and low carbon energy infrastructure will also need to demonstrate that they… iv. Will not result in unacceptable impacts in terms of visual appearance, noise, shadow flicker, watercourse engineering and hydrological impacts, pollution, or traffic generation';

- Policy DM12: Flood Risk, Sewerage and Drainage:

'Part A – Flood Risk: Proposals for development of new units in Flood Zones 2, 3a and 3b that are not defined by national planning guidance as being suitable for these zones will not be supported while development sites remain available in sequentially superior locations across the District. Reference should be made to the Council's Strategic Flood Risk Assessment when making assessments about likely suitability. Site specific Flood Risk Assessments will be required for all developments in flood risk areas, even where flood defences exist, as defined on the Proposals Map.

Part B – Sewerage and Drainage: Proposals for new development in… vi. North Wheatley,… ix. South Wheatley and x. Sturton-le-Steeple will only be supported where it is demonstrated to the Council's satisfaction that the proposed development will not exacerbate existing land drainage and sewerage problems in these areas. All new development will be required to incorporate Sustainable Drainage Systems (SuDS) and provide details of adoption, ongoing maintenance and management. Proposals will be required to provide reasoned justification for not using SuDS techniques, where ground conditions and other key factors show them to be technically feasible.'

12.2.23 BDC is currently in the early stages of preparing a new Local Plan for the District and began consulting on a Draft Bassetlaw Local Plan (Ref 12-27) in January 2019.

12.2.24 Policy 15: Flood Risk describes the requirements that developers are required to take into account relating to flood risk assessments, siting of developments in Flood Zones 2 and 3a and incorporation of SuDs.

12.2.25 In Policy 12: Reducing the Risk of Flooding, the Sturton Ward Neighbourhood Plan (Ref 12-28) is supportive of schemes where: *'the development proposed will*

not have a detrimental impact on the foul and surface water drainage infrastructure and… does not increase the rate of surface water run-off and increase flood risk in the area'.

12.2.26 Additionally, the policy clarifies that new development proposals will be required to protect existing watercourses and land drainage systems.

12.2.27 Local policies have been taken account in this assessment.

Internal Drainage Board (IDB) Byelaws

12.2.28 Internal Drainage Boards (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) (Ref 12-8) to undertake maintenance on any watercourse within their district other than 'Main Rivers' (i.e. those under the jurisdiction of the Environment Agency) and to supervise all matters relating to the drainage of land within their districts. Permissive powers means that 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.

12.2.29 The Trent Valley IDB operates in the flood risk study area for the Proposed Development. Any developer working in an IDB area should review the following byelaws (Ref 12-29):

- 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 9m of the edge of the watercourse;
- Byelaw 17: Fences, excavations, pipes etc.; and
- Byelaw 18: Interference with Sluices.

[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. NCC, 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

Other Guidance

Environment Agency Guidance for Pollution Prevention and Pollution Prevention Guidance Notes

12.2.30 The Environment Agency Guidance for Pollution Prevention (GPPs) series provide environmental good practice guidance for the whole UK, and environmental regulatory guidance directly to Northern Ireland, Scotland and Wales only.

12.2.31 The Guidance Notes of particular relevance to the Proposed Development include:

- GPP2 – Above Ground Oil Storage Tanks (Ref 12-30) offers advice on storage options, equipment and its maintenance and how to deal with spills.
- GPP 4 – Treatment and Disposal of Wastewater where there is no connection to the public foul sewer (Ref 12-31) offers advice if connection to the local sewage network is not possible and offers guidance on alternative means of wastewater disposal.
- GPP 5 – Works and Maintenance in or near water (Ref 12-32) 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.
- GPP 8 – Safe storage and disposal of used oils (Ref 12-33).
- GPP 21 – Pollution Incident Response Planning (Ref 12-34) 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

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

- Guidance C532 - Control of Water Pollution from Construction Sites (Ref 12-35) 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.
- Guidance C753 - The SuDS Manual (Ref 12-36) provides best practice guidance on the planning, design, construction, operation and maintenance of SuDS to facilitate their effective implementation within developments.

12.3 Assessment Methodology and Significance Criteria

Consultation

12.3.1 The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised *via* the Scoping Opinion (**Appendix 1B** (ES Volume II)) and in response to the statutory consultation is summarised in **Table 12-2**.

Table 12-2: Consultation summary table

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
Environment Agency	Scoping Opinion (June 2017)	Before the commencement of the site specific flood risk assessment it would be advisable to submit a product 4 data request to the Environment Agency.	A Product 4 (detailed flood risk report) has been received from the Environment Agency and has been assessed within the supporting FRA - **Appendix 12A** (ES Volume II).
		Given the proximity of parts of the site to the tidal flood defences of the River Trent the FRA should contain site specific breach analysis details.	Flood risk from all potential sources has been assessed within the supporting FRA - **Appendix 12A** (ES Volume II) which also details relevant mitigation.
		The FRA should include an assessment of flooding from all potential sources of flooding detailing relevant mitigation.	
		The FRA should address the increase in impermeable areas within the site and the effect on surface water runoff including relevant mitigation measures.	An Outline Drainage Strategy is provided within **Application Document Ref. 7.8**.
		Dependent on the construction of the outfalls then you may also need to apply for a flood risk permit.	The northern and southern outfall options to the River Trent (previously under consideration and shown in the PEI Report presented for formal consultation) have been removed from the

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			Proposed Development and the preferred option of connecting into existing drainage infrastructure associated with the existing West Burton Power Station site will be taken forward. Consequently, there will be no requirement for a flood risk permit.
Marine Management Organisation	Scoping Opinion (June 2017)	The ES should fully assess the potential impacts of the Project on flood risk, hydrogeology and water resources, with proposed mitigation measures included where necessary. Additionally, should any flood defence work be required, the MMO should be notified and details of this fully presented within the ES, including works methodology, alongside a robust assessment of impacts and any associated mitigation measures. Details of this would also need to be captured within the DML.	The potential impacts on the River Trent and a summary of the mitigation measures is included within this chapter. However, no works are now required within the River Trent or flood defences and no Deemed Marine Licence is now required. Flood risk has been assessed within the supporting FRA - **Appendix 12A** (ES Volume II).
Trent Valley IDB	Scoping Opinion (7.6.17)	Trent Valley IDB advise that the Board's watercourses are protected by byelaws if any of the Proposed Development proposals are within 9m of a Board maintained watercourse the Board's consent will be required.	The interaction between the Proposed Development and IDB byelaws are outlined in **Section 12.6.**
Canal and Rivers Trust	Scoping Opinion (June	The Canals and Rivers Trust advise any	The northern and southern outfall

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
	2017)	surface water outfalls to the River Trent as may be identified as being required so that flow rates of the discharges can be agreed and ensure that their location and means of construction do not impede navigation on the river or otherwise raise any navigational safety issues. Any need for such outfalls and any measures required to maintain safe navigation should be fully addressed within the EIA.	options to the River Trent (previously under consideration and shown in the PEI Report presented for formal consultation) have been removed from the Proposed Development. The preferred option of connecting into existing drainage infrastructure associated with the existing West Burton Power Stations will be taken forward. Consequently there will be no direct discharge to the River Trent or obstruction that would impede navigation on the river or otherwise raise any navigational safety issues.
Trent Valley IDB	18.09.17 (statutory consultation response on PEI Report)	The Trent Valley Internal Drainage Board advise that any obstruction to the flow of the river, or any increase in surface water run-off rates, temporary or permanent will require their prior written consent as any changes could affect their ability to conduct annual maintenance, periodic improvement and emergency works.	The northern and southern outfall options to the River Trent (previously under consideration and shown in the PEI Report presented for formal consultation) have been removed from the Proposed Development. The preferred option of connecting into existing drainage infrastructure associated with the existing West Burton Power Station site will be taken forward. Consequently,

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			there will be no direct discharge to the River Trent or obstruction to the flow of the river.
		Additionally, they advise that the design, operation and future maintenance of the site drainage systems must be agreed with the Lead Local Flood Authority and Local Planning Authority.	An Outline Drainage Strategy is provided within **Application Document Ref. 7.8**.
Canal and River Trust	26.09.17 (statutory consultation response on PEI Report)	The Canal and Rivers Trust advise that the development should not produce adverse "*impacts on navigation on the river or on navigational safety"*. The surface water outfalls, any change in river flow, or the construction of temporary cofferdams, have the potential to impact upon the navigation of the river and this must be given adequate consideration.	The northern and southern outfall options to the River Trent (previously under consideration and shown in the PEI Report presented for formal consultation) have been removed from the Proposed Development. The preferred option of connecting into existing drainage infrastructure associated with the existing West Burton Power Station site will be taken forward. Consequently, there will be no direct discharge to the river or obstruction that would impede navigation on the River Trent or otherwise raise any navigational safety issues.

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
Environment Agency	11.10.17 (statutory consultation response on PEI Report)	The Environment Agency has noted that the site specific breach assessments carried out by AECOM have shown that the majority of the main site lies within Flood Zone 1 and will remain dry even during a 1 in 1000 year breach scenario.	Flood risk from all potential sources has been assessed within the supporting FRA - **Appendix 12A** (ES Volume II) which also details breach assessment.
		It has been highlighted, however, that some sections of the site outline could become inundated by flood water; however this is confined to areas marked for the northern and southern outfall corridors. These areas are in the lowest lying areas of the site.	
		The Environment Agency has recognised that despite the northern and southern outfall options being within Flood Zone 2 and 3 they are not identified as the preferred option for the management of surface water runoff.	The northern and southern outfall options to the River Trent (previously under consideration and shown in the PEI Report presented for formal consultation) have been removed from the Proposed Development. The preferred option of connecting into existing drainage infrastructure associated with the existing West Burton Power Station site will be taken forward.
		The Environment Agency has highlighted that part of the construction laydown area lies	A summary of the mitigation measures is included within

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		within Flood Zone 2. If the area is to be utilised for the storage of construction materials, then a permit would be sought from the Environment Agency prior to use of the land.	**Section 12.7** this chapter. The potential need for a permit is considered in **Application Document Ref No. 4.2**: Other Consents and Licences
Marine Management Organisation	16.10.17 (statutory consultation response on PEI Report)	The MMO requests that prior to submission of the application to the Planning Inspectorate (PINS), EDF Energy ("the Applicant") enters into discussions with the MMO to discuss the content of the draft development consent order (DCO) and deemed marine licence (DML) to ensure that, where possible, issues are resolved prior to submission. Furthermore, the MMO recommends that the Applicant engages with other stakeholders with regards to other possible requirements for inclusion within the DCO.	A DML would have been required for the construction of the proposed surface water outfall connection, previously under consideration and shown in the PEI Report presented for formal consultation. However, this is no longer proposed and therefore no DML is required. Full consultation has been undertaken with statutory stakeholders and data and/or comments have been used to inform this assessment.
		Whether a marine licence is deemed within a DCO or consented independently by the MMO, the MMO is the delivery body responsible for post-consent monitoring, variation, enforcement and revocation of provisions relating to the marine environment. As such, the MMO has a keen interest in	A DML would have been required for the proposed surface water outfall connection, previously under consideration and shown in the PEI Report presented for formal consultation. However, this is no longer proposed and no

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		ensuring that provisions drafted in a DML enable the MMO to fulfil these obligations. This includes ensuring that there has been a thorough assessment of the impact of the works on the marine environment (both direct and indirect), that it is clear within the DCO which licensable activities are consented within the DML, that conditions or provisions imposed are proportionate, robust and enforceable and that there is clear and sufficient detail to allow for monitoring (if appropriate) and enforcement. Provided that the DML route is favoured by the applicant, the MMO would seek to agree the draft DML with the developer for inclusion with their application to PINS.	DML is required. This chapter includes assessment of direct and indirect effects on the marine environment where these are envisaged.
		Section 12.2.20 and 12.2.21 (of the PEI Report) reference the East Inshore and East Offshore Marine Plans but do not indicate clearly how the proposals are in accordance with the policy and objectives of the East Inshore Marine Plan. This assessment should be undertaken and included in any ensuing ES.	The relevant sections of the ES, including **Chapter 5**: Legislative Context and Planning Policy Framework have been updated to reflect other relevant policies and plans. As no direct effect on marine or tidal waters will arise from the Proposed Development, the East Inshore and East Offshore Marine Plans are no longer relevant to this assessment.

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		Section 12.5.9 considers storage of materials and specifically references the incorporation of measures 'set out in the Environment Agency PPG [Pollution Prevention Guidelines]'. PPGs were withdrawn from current government guidance for England on 17 December 2015. Clarity should be provided on if these historical archived documents are being used to inform material storage or if not, what the approach to material storage is being based upon. Consultation with the Environment Agency should be carried out with respect to use of any PPG.	Available Guidance for Pollution Prevention (GPP) documents which provide updated good practice guidance to the UK, together with Construction Industry Research and Information Association (CIRIA) good practice guidance for mitigation to protect the water environment have been used to inform the design and impact avoidance measures in this chapter where they provide relevant guidance.
		The PEI Report identifies the potential for works to construct a surface water drainage pipeline connecting either the proposed power plant site's north-eastern or south-eastern extents with the west side of the River Trent (Outline Drainage Strategy **Application Document Ref. 7.8**). The outfall for such a drainage system would be located within the tidal reaches of the River Trent, below Mean High Water Springs (MHWS). The construction of drainage pipelines within tidal waters is licensable under the Marine and Coastal Access Act 2009 ("the 2009 Act"). As such, should this option be taken	A DML would have been required for the proposed surface water outfall connection previously under consideration. However, this is no longer proposed and no DML is required. This Chapter includes assessment of direct and indirect effects on the marine environment where these are envisaged.

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		forward, full details should be included within the DML. When considering the works required to install the associated infrastructure for the new outfall, 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 been scoped out. Within the PEI Report, 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, required to enable construction works to take place within the river. The PEI Report does not adequately describe the proposed works, nor does it set out a detailed methodology for installing the associated infrastructure for this new outfall. When available, further details on the proposed methodology for carrying out these works must be included within the ES to enable a thorough assessment of impacts	

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		to be undertaken. The MMO notes that a number of mitigation measures have been considered within the PEI Report in order to minimise impacts upon the marine environment when constructing the new outfall, such as the use of silt curtains, pre-construction sediment testing, installation during lower flow periods, and the return to river of fish trapped behind the cofferdam during draw down. It should be noted that certain measures and activities such as the installation of silt curtains and sediment sampling may be licensable themselves under the 2009 Act and as such should be included within the DML (if favoured) or Marine Licence.	
		Section 12.6.12 states the following in relation to suspended sediments: '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 does not appear to correlate with the earlier judgments given in section 12.6.3 where the report concludes	Following updates to the Chapter, these comments correlate with **Section 12.6.11** - **Section 12.6.19** have been updated accordingly to address potential impacts re-suspension of contaminated sediments.

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		that baseline sediment concentrations are high and as such, 'localised impacts are likely to be trivial'.	
		Within Section 12.6.48, the report states that 'Decommissioning of the Proposed Development would be undertaken in accordance with the Environmental [Environmental] Permit'. Should it be anticipated as a future requirement, the MMO would request that details of the outfall decommissioning be supplied and included within the DML (if favoured) or Marine Licence.	A DML would have been required for the proposed surface water outfall connection previously under consideration. However, this is no longer proposed and no DML is required. This Chapter includes assessment of direct and indirect effects on the marine environment where these are envisaged.
		Section 12.5.20 addresses the cofferdams which may be used as part of the outfall construction works. As has been noted above, details on the extent to which cofferdams will interface with the River Trent should be provided as soon as possible so that the MMO can fully consider impacts to river navigation and other marine users. Again within section 12.5.21, the approach to cofferdam construction is referenced; 'The cofferdam would be designed to minimise changes in riverbed and bank erosion and toe scour over the duration of use'. Is the	The northern and southern outfall options to the river have been removed from the Proposed Development and the preferred option of connecting into existing drainage infrastructure associated with the existing West Burton Power Station site has been decided. Consequently, the use of cofferdams is no longer required. The Chapter has been updated accordingly.

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		reduction of toe scour in relation to the toe of the outfall headwalls or in relation to reducing scour impacts at the foot of the cofferdam wall? It is currently unclear. Section 12.5.23 states that 'whilst in-situ, the cofferdam would be regularly inspected and maintenance undertaken, where required […]'. The applicant should note that these individual working components may have their own licensing requirements. The applicant should therefore engage with the MMO at the earliest opportunity so that the drafted DML or Marine License will encompass all likely construction and maintenance activities. Section 12.5.26 raises the potential for there to be erosion on the eastern banks of the River Trent adjacent to/opposite the outfall locations. If the construction of the outfall (and associated cofferdam) is likely to have a catalysing effect on existing erosion, this needs to be fully explained. Again in relation to 12.5.26, the report notes that 'The cofferdams might have the effect of locally accelerating and diverting flows into channel banks, but temporary bank protection could mitigate this, as would the design and	

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		scale of the cofferdam structure'. As above, the likely impacts on neighbouring riverbanks arising from the construction works need to fully detailed as well as any associated mitigation plans.	
		The Flood Risk Assessment (FRA) included as part of the PEI Report assumes that the preferred option to discharge into the existing drainage system associated with West Burton A is taken forward and therefore only this option has been appraised further within the FRA. The FRA adds that, should the design of the proposed development change such that discharge to the northern and southern outfalls are considered, assessment of the impact of this discharge on fluvial flood risk from the River Trent would be required. The MMO supports this and would highlight that, should it be decided that works are required to update, maintain or alter any existing flood defences, or if new flood defences along the River Trent are required, these activities may also be licensable under the 2009 Act. As such, should an outfall option be retained as the detailed design progresses, the MMO would expect to be consulted further with regards to potential impacts on flood defences. In addition to this, the MMO would	The Flood Risk Assessment (FRA) included as part of the PEI Report was based upon the preferred option to discharge into the existing drainage system associated with West Burton A Power Station. It is confirmed that only this option is now to be taken forward and therefore the basis for the FRA is appropriate.

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		note that consultation with the Environment Agency should be carried out with respect to FRA.	
		Section 12.5 addresses development of design options and impact avoidance. Within this section, a number of relevant control and mitigation measures are presented. The applicant should engage with the MMO at the earliest opportunity so that these measures can be confirmed and transposed into draft form within a DML (if favoured), alongside any others that are necessary.	A DML would have been required for the proposed surface water outfall connection previously under consideration. However, this is no longer proposed.
Natural England	16.10.17 (statutory consultation response on PEI Report)	Natural England is satisfied with the information provided within this chapter and acknowledges that the impact on biodiversity has been considered in relation to watercourses, drains and other water features.	Comment only – no response required.
Trinity House	17.10.17 (statutory consultation response on PEI Report)	Trinity House will await final details of the proposed works below the high water mark, such as the outfall structure, before providing more substantive comments.	The northern and southern outfall options to the River Trent previously under consideration have been removed from the Proposed Development and the preferred option of connecting into existing drainage infrastructure associated with the existing West

Consultee or organisation approached	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			Burton Power Station site will be taken forward.
Bassetlaw District Council Environment Agency Lincolnshire County Council Marine Management Organisation Nottinghamshire County Council West Lindsey District Council	March/April 2019	Provision of copies of final draft chapter and offer of pre-application meeting to each consultee to: • discuss final proposals and assessments; • obtain feedback prior to submission of Application; and • agree an approach to drafting of Statements of Common Ground (SoCG) prior to submission of the Application. Further details on consultation undertaken can be found in the Consultation Report (**Application Document Ref. 7.1**).	

Summary of Key Changes to Chapter 12 since Publication of the Preliminary Environmental Information (PEI) Report

12.3.2 The PEI Report was published for statutory consultation in September 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.

12.3.3 The key changes since the PEI Report was published are summarised in **Table 12-3**.

Table 12-3: Summary of key changes to Chapter 12 since publication of the PEIR

Summary of change since PEIR	Reason for change	Summary of change to chapter text in the ES
The northern and southern outfall options to the River Trent that were previously under consideration and presented in the PEI Report have been removed from the Proposed Development and the associated construction works to the flood defence or in the river and mitigation measures (i.e. cofferdams, silt curtains etc.) are therefore not required. Consequently, there is no longer any requirement for an Environment Agency Permit for works on or near a flood defence or a DML from the MMO. In addition, the WFD Screening Assessment is also no longer required.	The preferred option of using existing drainage infrastructure within the West Burton Power Station site will be taken forward.	The assessment only considers the potential impact of increased surface water run-off on the drainage system as well as the associated flood risk. A WFD Screening Matrix is not included as part of the ES (as it was in the PEI Report) given that there would be no impacts on WFD status and objectives of the River Trent (see **Section 12.6**).
Construction phase assessment year updated.	To reflect updated indicative construction programme.	Update of relevant paragraphs in **Section 12.6**

Assessment Methods

12.3.4 There is no standard methodology for assessing the magnitude of impacts and significance of effects of 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.

12.3.5 The assessment criteria used in this chapter are based on the web-based Department for Transport (DfT) document 'Transport Analysis Guidance' (known as WebTAG) Unit A3 (Ref 12-37). 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 (including the Proposed Development) in the absence of other suitable guidance.

12.3.6 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) (Ref 12-38)) and professional judgement.

Significance Criteria

12.3.7 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 12-4**), 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 12-5**).

12.3.8 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 12-4: Importance of water feature or resource (modified from WebTAG Unit A3)

Importance	Criteria	Examples
Very high	Attribute with a high quality and rarity,	**Water resources**: Watercourse having a WFD classification as shown in a River

Importance	Criteria	Examples
	regional or national scale and limited potential for substitution.	Basin Management Plan (RBMP) and Q95 ≥ 1.0m^3/s Source Protection Zone (SPZ) 1 within a Principal Aquifer **Water abstraction**: >1,000m^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, regional or national scale and limited potential for substitution.	**Water resources**: Watercourse having a WFD classification as shown in a RBMP, and Q95 < 1.0m^3/s Principal Aquifer (not within SPZ 1) [Cyprinid or Salmonid fishery] **Water abstraction**: 500-1,000m^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**: 50-499m^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**: <50m^3/day **Receptors to flood risk**: water compatible development*

* As defined in Table 2 of the Flood Risk section of the NPPG (Ref. 12-24)

** 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).

Magnitude of Impacts

12.3.9 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, which is further described in **Table 12-5**.

12.3.10 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.

12.3.11 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 Site, such as topography, geology, climatic conditions and potential sources of contamination.

12.3.12 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.

12.3.13 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 12-5: 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.

Magnitude	Impact	Description
	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 negative effect to an attribute	Measurable increase in surface water ecological or chemical quality; increase in yield or quality of aquifer not affecting 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.

12.3.14 In the context of the Proposed Development, short-term effects are considered to be those associated with the construction and decommissioning phases and which cease when construction or decommissioning works are completed; long-term effects are those associated with the completed, operational Proposed Development and which last for the duration of the operational phase. Effects may also be permanent (irreversible) or temporary (reversible) and direct or indirect.

12.3.15 Effects on areas on the scale of the Nottinghamshire or Lincolnshire County or Bassetlaw or West Lindsey District (or similar scale, across local authority boundaries) are considered to be at a regional level, whilst effects that cover

different parts of the country, or England as a whole, are considered being at a national level. Smaller scale effects (to the Site or neighbouring sites) are considered to be at a local level.

Significance of Effects

12.3.16 The following significance categories have been used for both potential and residual effects:

- Neutral: effects to a water resource receptor that are neither advantageous or detrimental;
- Beneficial: a beneficial/positive effect on the quality of a water resource receptor; or
- Adverse: a detrimental/negative effect on the quality of a water resources receptor.

12.3.17 When an effect is considered to be beneficial or adverse, the following levels of significance are stated, as shown in **Table 12-6**:

- Negligible: imperceptible effects to a water resources receptor;
- Minor: a limited, very short or highly localised effect on a water resource of high or medium importance, or a wide extent or long duration effect on a water resource of low quality/importance. A minor effect would not prevent compliance with legislation, water quality standards or policy;
- Moderate: a local scale medium magnitude of change on a water resource of high quality; or a large (reversible) effect on a water resource of medium quality/importance. A moderate effect would not affect the long-term status of a waterbody under the WFD; and
- Major: a magnitude of change on a water resource of high quality/importance resulting in a deterioration of waterbody status; preventing WFD objectives or compliance with other legislation being met.

12.3.18 The significance of a potential effect is derived by considering both the importance of the feature and the magnitude of the impact, using a matrix as illustrated in **Table 12-6**.

Table 12-6: 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

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

12.3.19 In line with other EIA disciplines, this chapter considers that major or moderate effects are deemed to be significant.

Rochdale Envelope

12.3.20 As set out in **Chapter 4**: The Proposed Development, there are areas for which there is currently variability in the design that could affect the assessment. It is assumed that the areas of hardstanding for each of the schemes defined within the Rochdale Envelope will remain the same and will not affect this assessment.

12.3.21 The FRA (**Appendix 12A** (ES Volume II)) considers the maximum building dimensions shown in the indicative layouts (**Figure 4.1a** and **Figure 4.1b** in ES Volume III) to determine the anticipated surface water runoff from the Site.

12.4 Baseline Conditions

Extent of Study Area

12.4.1 The Site encompasses the land required for the construction and operation of the Proposed Development and associated connections. The Site is located on the banks of the River Trent, and comprises an area of grassland to the north of West Burton B (WBB) Power Station which was formerly a Pulverised Fuel Ash (PFA) disposal site (see **Figure 3.1** in ES Volume III).

12.4.2 This assessment considers water bodies that are hydrologically connected with the Site, based on available data. The main watercourses in the vicinity of the Site include the River Trent, Wheatley Beck and Catchwater Drain. The assessment considers watercourses 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 watercourse, based on professional judgement.

12.4.3 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.

Sources of Information/Data

12.4.4 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 (Ref 12-39);
- Environment Agency website (Ref 12-40);
- Humber River Basin Management Plan (RBMP) (Ref 12-41);
- Groundsure Report (included within **Appendix 11A**: Phase I Geo-environmental Site Assessment (ES Volume II));
- 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;
- BDC Strategic Flood Risk Assessment (Ref 12-42);
- Nottinghamshire County Council (NCC) Preliminary Flood Risk Assessment (Ref 12-43); and
- A walkover of the study area by ecologists and land contamination specialists (undertaken in Spring/Summer 2017 and January 2019) to identify, locate and describe water resource receptors. Further information is outlined in **Chapter 9**: Ecology and **Chapter 11**: Ground Conditions and Hydrogeology.

Existing Baseline

Topography

12.4.5 According to the most recent topographical survey of the Site (Ref 12-44), the ground level varies from a low point of 2.6m Above Ordnance Datum (AOD) within the proposed southern drainage connection corridor, to a high point of 16.2m AOD on a raised mound at the northern end of the Proposed Power Plant Site. The majority of the Site lies between 10m and 14m AOD, including the (Proposed Power Plant Site), the electricity connection route, and the western two-thirds of the proposed construction laydown area.

12.4.6 A notable steep ridge is present immediately to the east of the Site and adjacent to the electricity connection route, where ground descends from a plateau at approximately 12m AOD to approximately 3m AOD, over a short distance.

Drainage

12.4.7 The Site comprises predominantly undeveloped land that drains via natural processes of overland flow and infiltration to ground.

12.4.8 Areas of the Site where hardstanding is located (such as the existing gas receiving facility and 400kV switchyard used by and located within the WBB Power Station site) would continue to drain to the existing surface water drainage system associated with the WBB Power Station.

12.4.9 West Burton Sewage Treatment Works (STW) is located to the edge of the Site to the east and is owned and operated by Severn Trent Water which holds the appropriate consent to discharge to the River Trent. The STW takes foul water from the West Burton A (WBA) and WBB Power Stations.

Surface Waterbodies

12.4.10 The tidal stretch of the River Trent (Environment Agency Main River) lies approximately 36m to the east of the proposed northern drainage connection corridor, 40m to the east of the southern drainage connection corridor and approximately 225m to the east of the Proposed Power Plant Site.

12.4.11 Wheatley Beck, an Ordinary Watercourse under the jurisdiction of the Trent Valley IDB, is located to the north and north-east of the Site and flows west to east and then north to south-east adjacent to the areas under consideration for ecological mitigation to the north of the Site. The watercourse forms a confluence with the River Trent approximately 165m from the north-east boundary of the Site.

12.4.12 Catchwater Drain, an Ordinary Watercourse under the jurisdiction of the Trent Valley IDB, flows from south-west to north-east passing to the east of Burton Round. Catchwater Drain outfalls via a pumped discharge to the River Trent approximately 415m from the eastern boundary of the WBB 400kV switchyard.

12.4.13 An un-named drain, under the jurisdiction of the Trent Valley IDB, is located to the south of the West Burton Power Station site and flows from west to east parallel with River Road. The drain discharges to the Catchwater Drain approximately 120m upstream of the pumping station.

12.4.14 Railway Dyke Drain, an Ordinary Watercourse under the jurisdiction of the Trent Valley IDB, flows from south-west to north-east, parallel with railway loop. The drain is pumped, via the Wheatley Beck pumping station, into the Wheatley Beck at NGR 479434,386438.

12.4.15 There is a small land drain to the north of the railway loop within the coal stockpile area which flows intermittently. The drain serves the low lying area beneath a small viaduct carrying the railway tracks at the northern end of the stockpile area. The drainage system consists of a drainage sump which is emptied by the Viaduct Pump House and discharges to Wheatley Beck. The system only discharges in periods of rainfall and only drains a small area of land which has not been used for coal storage.

12.4.16 There is a drainage channel located around the periphery of the railway loop which drains water from the railway loop and coal stockpile area. This drainage channel discharges to the Wheatley Beck, to the north-west of the railway loop via oil interceptors.

12.4.17 The following additional surface water features have been identified within, or in close proximity to, the Site:

- reedbeds present to the south-east of the Site within West Burton Reedbed LWS. These are currently managed in late summer by cutting parts of the reedbed to maintain areas of open water;
- a small area of reedbed (approximately 500m^2) adjacent to an access track in the north of the Site;
- ash lagoons located to the north-west of the Site;
- several large, longitudinal flooded former gravel pits are present to the east of the Site within West Burton Power Station Local Wildlife Site (LWS). These have steep to vertical banks and deep, clear water (over 1m deep at the margins). The waterbodies have been stocked with a range of coarse fish;
- a wet ditch is present at the base of the bank leading down to the flooded gravel pits to the east of the Site. The wetted channel is approximately 1-2m wide and 0.5m deep, with generally shallow earth banks; and
- several areas of standing open water are present within the reedbeds and wet woodland within West Burton Reedbed LWS to the south-east of the Site.

Surface Water Quality

12.4.18 The classification of waterbodies is reported in the 2015 cycle of the River Basin Management Plans (RBMP). The Humber RBMP (Ref 12-41) assesses the pressures facing the water environment in the Humber river basin district and lists actions to address them. The Humber RBMP is in the second iteration of a series of six-year planning cycles and will be updated in 2021.

12.4.19 Some surface water bodies are designated as ‘artificial’ or ‘heavily modified’. This is because they may have been created or modified for a particular use such as water supply, flood protection, navigation or urban infrastructure.

12.4.20 According to the Humber RBMP, by definition, artificial and heavily modified waterbodies are not able to achieve natural conditions. Instead the classification and objectives for these waterbodies, and the biology they represent, are measured against ‘ecological potential’ rather than status. For an artificial or heavily modified waterbody to achieve good ecological potential, the chemistry must be good. Chemical status is assessed by compliance with the environmental standards for chemicals that are listed in the Priority Substances Directive 2008/105/EC, which is a ‘daughter’ directive of the WFD (Ref 12-1). Chemical status is recorded as either ‘good’ or ‘fail’, in terms of whether the chemical status is compliant with environmental standards.

12.4.21 In addition, any modifications to the structural or physical nature of the waterbody that harm biology must only be those essential for its valid use. All other such modifications must have been altered or managed to reduce or remove their adverse impact, so that there is the potential for biology to be as close as possible to that of a similar natural waterbody. Often though, the biology will still be impacted and biological status of the waterbody may be less than good (Ref 12-

41). The ecological status takes into account physio-chemical elements, biological elements, specific pollutants and hydromorphology.

River Trent

12.4.22 The stretch of the River Trent nearest to the Site (defined in the WFD as 'GB104028058480 - River Trent from Carlton on Trent to Laughton Drain') is classified as an artificial waterbody due to land drainage and navigation modifications.

12.4.23 Water quality within the stretch of the River Trent adjacent to the West Burton Power Station site has been generally improving, reaching 'moderate' overall and ecological potential and 'good' chemical status in the 2015 cycle of the Humber RBMP process (there are five classes of ecological status; high, good, moderate, poor and bad). 'Good' ecological potential is expected to be met in 2027 and is based on the following quality elements: biological quality, general chemical and physio-chemical quality, water quality with respect to specific pollutants (synthetic and non-synthetic), and hydromorphological quality.

12.4.24 Based on **Table 12-4**, the River Trent is considered to be a water resource receptor of very high importance with respect to water quality.

Wheatley Beck

12.4.25 Wheatley Beck (defined in the WFD as 'GB104028058360 - Wheatley Beck Catchment (trib of Trent')) is classified as a heavily modified waterbody although no reason is provided for this designation within the WFD (Ref 12-41). Wheatley Beck is currently classified as having 'moderate' ecological potential and 'good chemical status. 'Good' ecological potential is expected to be met in 2027.

12.4.26 Based on **Table 12-4**, Wheatley Beck is considered to be a water resource receptor of high importance with respect to water quality, as it has water quality objectives under the WFD.

Catchwater Drain and Associated Tributaries

12.4.27 Catchwater Drain (defined in the WFD as 'GB104028058350 - Catchwater Drain catchment (trib of Trent')) is classified as a heavily modified waterbody although no reason is provided for this designation within the WFD (Ref 12-41). Catchwater Drain is classified as being of 'moderate' ecological potential and 'good' chemical status. 'Good' ecological potential is expected to be met in 2027 (Ref 12-41). Although the associated tributaries of Catchwater Drain have no designation under WFD, it is likely that water quality and hydrological conditions are similar to that of Catchwater Drain.

12.4.28 Based on **Table 12-4**, Catchwater Drain and its associated tributaries are considered to be water resource receptors of high importance with respect to water quality.

Railway Dyke Drain and Land Drain to North of the Site

12.4.29 Railway Dyke Drain, the drain to the south and the land drain to the north of the Site are not classified under the WFD and no water quality information is provided within the Humber RBMP.

12.4.30 Given that the watercourses are detailed in the Digital River Network but do not have a WFD classification as shown in a RBMP (**Table 12-4**), the Railway Dyke Drain, the drain to the south and the land drain are considered to be water resource receptors of medium importance.

Additional Identified Surface Water Features

12.4.31 The additional surface water features identified in paragraph 12.4.17 are not classified under the WFD and no water quality information is provided within the Humber RBMP.

12.4.32 Given that the surface water features are not detailed in the Digital River Network and do not have a WFD classification as shown in a RBMP (**Table 12-4**), these features are considered to be water resource receptors of low importance.

12.4.33 Information from the Groundsure Report (refer to **Appendix 11A:** Phase I Geo-environmental Site Assessment (ES Volume II)) indicates there are no surface water abstractions for potable water within a 2km radius of the West Burton Power Station site.

12.4.34 The Applicant holds an abstraction licence for water from the River Trent adjacent to the Site. The abstracted water is used for boiler feed and cooling uses with a maximum daily volume of 445,508m^3 from the River Trent.

12.4.35 There are four further surface water abstractions listed within 2km of the Site operated by a number of different companies for hydraulic testing and spray irrigation. Three of these are shown as historic and relate to the River Trent. One active surface water abstraction for spray irrigation up to a maximum daily volume of 454.6m^3 from Hall Farm reservoir on Saundby Beck is listed.

12.4.36 Based on the examples in **Table 12-4** the River Trent is considered to be a receptor of high importance in relation to water supply abstractions.

12.4.37 Information from the Groundsure Report indicates there are twelve Licensed Discharge Consent records within a 0.5km radius of the West Burton Power Station site. Of these, all but three licences are listed as 'revoked'.

12.4.38 Emissions to water from the West Burton Power Station site comprise process effluent and site surface water and oily water including surface water drainage via oil interceptors. These are monitored in accordance with the Environmental Permit and discharged directly to the River Trent via an existing outfall or indirectly to the River Trent via Wheatley Beck.

12.4.39 Other discharge licences include:

- one licence for West Burton Sewage Treatment Works for sewage discharges (final/treated effluent) direct to the River Trent approximately 120m to the north of the Site;
- one licence for West Burton Pumping Station for a sewer storm overflow indirectly to Catchwater Drain, approximately 65m to the south-west of the Site;
- two licences relate to other processes; and
- one licence for Sturton-le-Steeple Quarry for process effluent direct to the River Trent, approximately 0.4km east of the Site.

Recreation

12.4.40 No recreational clubs using the watercourses for recreational purposes in the area surrounding the West Burton Power Station site have been identified; any fishing in the adjacent ponds to the east of the Site is private.

12.4.41 The nearest identified local boating club to the Site is Torksey Yacht Club, located at the junction of the Fossdyke Navigation and the River Trent, south-east of Cottam Power Station, approximately 8km south of the Site.

12.4.42 According to the Canal & Rivers Trust website (Ref 12-45), the nearest identified fishery is located to the north-east of Cottam Power Station, upstream of the Site on the River Trent, on the right bank, at Marton (approximately 365m upstream of the pumping station).

12.4.43 OS mapping indicates that public access to the riverside via definitive footpaths and/or bridleways is available along the River Trent, Wheatley Beck and Catchwater Drain. Given the above information, it is considered that the River Trent is a water resource of high importance with regard to recreation. As access is possible along the Wheatley Beck and Catchwater Drain, these water resources are considered to be of medium importance with regard to recreation.

12.4.44 There is no public access to either the Railway Dyke Drain, or the land drain to the north of the Site. Therefore, these water resources are considered to be of low importance with regard to recreation as are the other identified water features.

Biodiversity

12.4.45 There are no international nature conservation designations within the study area (refer to **Chapter 9:** Ecology).

12.4.46 There is one national nature conservation designation in the study area. Lea Marsh SSSI is located approximately 1km north-east of the Site, and lies approximately 1.5km downstream of the Site along the River Trent. The River

Trent provides connectivity between the Site and the SSSI, as the SSSI is subject to seasonal inundation from the watercourse.

12.4.47 There are eleven Local Wildlife Sites (LWS) within 2km of the Site. West Burton Power Station LWS lies partly within the boundary of the Site, and a further four are located within a 500m radius. Further details of the LWS are summarised in **Chapter 9**: Ecology.

12.4.48 The River Trent is designated under the Freshwater Fish Directive, the Nitrates Directive and the Urban Wastewater Treatment Directive. The River Trent also has ecological classification under the WFD and, therefore, is considered to be a water resource of high importance with regard to biodiversity.

12.4.49 Both Wheatley Beck and Catchwater Drain are designated under the Nitrates Directive and have ecological classification under the WFD and, therefore, are considered to be water resources of high importance with regards to biodiversity.

12.4.50 Although the remaining identified watercourses/surface water features within the study area have no ecological classification under the WFD, site walkovers undertaken as part of the ecological baseline study (as outlined in **Chapter 9**: Ecology) identifies the study area as having potential for great crested newts, refuge habitats for otter and interest for water beetles. Given this information, these watercourses/water features are considered to be of medium importance with regard to biodiversity.

Geology

12.4.51 **Chapter 11**: Ground Conditions and Hydrogeology contains a detailed review of the geology and hydrogeology of the area. In summary, the strata at the Site from ground level down comprise:

- made ground deposits, including a layer of Pulverised Fuel Ash (PFA) (reported in previous site investigations);
- superficial deposits of alluvium comprising clay, silt, sand and gravel; and
- bedrock comprising the Mercia Mudstone group (mudstone or dolomitic siltstone).

Hydrogeology

12.4.52 The alluvium superficial deposits are classified as a Secondary A aquifer. The Environment Agency defines Secondary A aquifers as being ‘permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases, forming an important source of base flow to rivers.

12.4.53 Groundwater monitoring data taken from the Annual Groundwater Monitoring Report (produced by EDF in 2017 (Ref 12-46)) indicates that groundwater levels vary from 12m AOD to a more typical 2–7m AOD across the majority of the West Burton Power Station site. Most of the Site lies at an elevation of between 10-14m

AOD, and is therefore approximately 4–8m above typical groundwater levels. Monitoring data suggests that estimated groundwater levels may vary from 2.5m bgl close to the banks of the River Trent, to 4.1-4.3m bgl in the north of the Site; to 4.8-5.1m in the south (Ref 12-46) (stated figures are approximate).

12.4.54 During an initial intrusive ground investigation in December 2017, water strikes were identified during drilling at depths of 1–4m AOD, typically associated with the base of the PFA and top of the superficial deposits. Subsequent monitoring of standing water levels in the installed wells ranged from 3.3 to 5.8m AOD indicating sub-artesian conditions. It should be noted that groundwater levels are based on a single monitoring event, and additional monitoring is needed to assess any potential seasonal changes reflecting decreased rainfall and increased evapo-transpiration rates.

12.4.55 The Mercia Mudstone bedrock is classed by the Environment Agency as a Secondary (Undifferentiated) aquifer. The Environment Agency defines Secondary (Undifferentiated) aquifers 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.

Groundwater Quality

12.4.56 The Site is not located within a groundwater Source Protection Zone (SPZ).

12.4.57 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

12.4.58 The Environment Agency groundwater vulnerability mapping (refer to the Groundsure Report presented in **Appendix 11A**: Geo-environmental Site Assessment (ES Volume II)) shows that the alluvium superficial deposits across the Site have been assigned a 'Minor Aquifer/ High' vulnerability classification. This indicates that they have been assigned a high leaching potential. Soils of a high leaching potential are considered to have little ability to attenuate diffuse source pollutants and allow liquid discharges to move rapidly into underlying strata and shallow groundwater. It is therefore likely that groundwater quality in the superficial strata in the vicinity of the Site is poor.

12.4.59 Using the examples presented in

12.4.60 **Table** 12-2, 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

12.4.61 The WFD status of the local groundwater (GB40402G990300 – Lower Trent Erewash – Secondary Combined) currently has Poor 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.

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

12.4.63 The Lower Trent Erewash – Secondary Combined waterbody is considered to be a water resource receptor of high importance with respect to water quality having a WFD classification as shown in the RBMP.

Groundwater Abstractions

12.4.64 The Groundsure Report (included within **Appendix 11A:** Phase I Geo-environmental Site Assessment (ES Volume II)) records a single groundwater abstraction license approximately 2km north-east of the Site relating to an active Anglian water potable water supply borehole..

12.4.65 Although the Lower Trent Erewash – Secondary Combined waterbody is not a Principal aquifer, there is an active groundwater abstraction in the vicinity of the Site and the wider aquifer is designated as a Drinking Water Protected Area. It is therefore considered to be a water resource receptor of high importance with regard to water supply.

Flood Risk

12.4.66 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.

12.4.67 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.

12.4.68 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 (see **Appendix 12A**: Flood Risk Assessment (ES Volume II)). The FRA has been prepared in accordance with the NPPF and supporting NPPG. 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 majority of the Site is shown to be at low risk from fluvial, tidal, and artificial sources, as well as flooding from drainage infrastructure;
- there is considered to be a medium risk of flooding from groundwater, although should groundwater be encountered during the construction phase in lower lying areas, it is considered that this could be easily dealt with by the use of a small pump, and would not increase groundwater flood risk to the wider area during or after the construction phase; and
- there remains a residual low risk of flooding to the Site from a breach of the flood defences and from failure or exceedance of the surface water drainage system.

12.4.69 The FRA (**Appendix 12A**, ES Volume II) serves to demonstrate that the Proposed Development would remain safe during its lifetime and would not increase flood risk elsewhere and is, therefore, considered to be acceptable in flood risk terms.

12.4.70 A 49MW Battery Storage Facility commenced operation in 2018 within the WBB Power Station site including 20 lithium battery storage units, with ancillary voltage conversion and underground cabling. Each battery unit is contained within a steel shell, and placed on a concrete slab. This development is not anticipated to have materially changed the baseline for the purposes of this assessment.

12.4.71 In the unlikely event of any releases or spills from the batteries, these are unlikely to impact the Proposed Development, due to the location of the Battery project within the WBB Power Station site.

Summary of Baseline Conditions and Importance of Existing Resource

12.4.72 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.

12.4.73 A summary of the importance of the waterbodies in the vicinity of the Proposed Development is provided in **Table 12-7**.

Table 12-7: Importance of identified surface water feature/receptor

Water Resource	Attributes	Importance

Water Resource	Attributes	Importance
River Trent	Water quality	Very High
	Recreation/other uses	High
	Water supply	High
	Biodiversity	High
Wheatley Beck	Water quality	High
	Recreation/other uses	Medium
	Biodiversity	High
Catchwater Drain (and associated tributaries)	Water quality	High
	Recreation/other uses	Medium
	Biodiversity	High
Railway Dyke Drain and Land drain to north of Site	Water quality	Medium
	Recreation/other uses	Low
	Biodiversity	Medium
Additional Identified Water Features	Water quality	Low
	Recreation/other uses	Low
	Biodiversity	Medium
Secondary A aquifer (shallow groundwater)	Groundwater vulnerability	Medium
Secondary B aquifer (deep groundwater)	Groundwater vulnerability	High
	Water supply/abstractions	High

Future Baseline – Pre-Construction (2020)

12.4.74 Subject to the necessary consents being granted and an investment decision being made, construction of the Proposed Development could potentially start as early as Quarter 3 (Q3) 2020. Baseline conditions pre-construction in 2020 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 Trent, Wheatley Beck and Catchwater Drain to achieve 'Good' ecological and chemical potential is 2027, and it is not anticipated that significant progress will have been made by 2019/early 2020. The future baseline (2020) is therefore assessed to be similar to current baseline conditions.

Surface Water

12.4.75 In terms of water quality, the River Trent, Wheatley Beck and Catchwater Drain currently have moderate ecological potential and 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 2020.

12.4.76 No substantial changes are anticipated to all other identified waterbodies by 2020.

Groundwater

12.4.77 Groundwater quality of the underlying Secondary Undifferentiated Aquifer is currently 'Poor', and the waterbody has 'Good' quantitative status. 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 2020.

12.4.78 No substantial changes are anticipated to Secondary A Aquifer by 2020.

Flood Risk

12.4.79 It is unlikely that that there would be any substantial change in the risk of flooding from all sources by 2020.

Future Baseline – Operation (2027 - 2063)

12.4.1 The Proposed Development is unlikely to commence commercial operation before 2023 but for the purposes of assessing a future baseline, conditions in 2027 (the target year for WFD compliance) have been selected and could be moderately different to current baseline conditions as set out below.

Surface Water

12.4.2 In terms of water quality, it is expected that water quality in the River Trent, Wheatley Beck and Catchwater Drain will improve, meeting the requirements of the WFD ('Good' ecological and chemical potential) by 2027. Although water

quality within the River Trent, Wheatley Beck and Catchwater 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.

12.4.3 No substantial changes are anticipated to all other identified waterbodies by 2027.

Groundwater

12.4.4 It is expected that groundwater status will improve by 2027, 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 Mercia Mudstone will continue to have water quality objectives under the WFD and will remain designated as a Secondary B Aquifer.

12.4.5 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 2027.

Flood Risk

12.4.6 It is envisaged that the Proposed Development would have an operational life of up to circa 40 years, therefore decommissioning activities are currently anticipated to commence after 2063. Based on the Environment Agency climate change guidance (Ref 12-47), it is likely that the peak river flow in the River Trent, Wheatley Beck and Catchwater Drain and the minor watercourses will have increased by a maximum of 30% by the year 2063, based on predictions for the Humber River Basin District. Peak rainfall intensity is also predicted to increase by a maximum of 20% across the same timescale.

12.4.7 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 tidal and surface water flooding.

12.4.8 Given the potential changes outlined above, the future baseline (2063) is therefore assessed as a worst-case scenario as it represents the lifetime of the Proposed Development.

12.5 Development Design and Impact Avoidance

12.5.1 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 any general changes to the quantity of a waterbody as a resource).

12.5.2 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

12.5.3 The following impact avoidance measures would either be incorporated into the design or are standard construction and operational practices. These measures have therefore been taken into account during the impact assessment in **Section 12.6**. Any need for additional mitigation measures as identified as a result of the impact assessment are described (where necessary) in **Section 12.7**.

Construction

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

12.5.5 As a general measure to protect ground and surface water from a range of activities associated with construction of this type, best practice would be implemented through a Framework Construction Environmental Management Plan (CEMP), whilst the contractors undertaking the works at the Proposed Development would comply with relevant guidance during construction, including the Environment Agency GPP, CIRIA guidance and IDB byelaws. A Framework CEMP has been prepared to accompany the DCO Application (**Application Document Ref. No. 7.3**); the final CEMP prepared by the contractor will be in accordance with the principles set out in the Framework CEMP. It is proposed that this will be secured by a Requirement of the draft DCO.

12.5.6 Piling design and construction works would be completed following preparation of a piling risk assessment, completed in accordance with the Environment Agency's '*Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention*' (Ref 12-48). A piling and penetrative foundation design method statement would be submitted to, and after consultation with the Environment Agency, subject to local planning authority approval prior to relevant works commencing; it is proposed that this is secured by a Requirement of the draft DCO.

Staff Awareness/Training

12.5.7 The contractor(s) would ensure that Proposed Development construction 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 would be included in the site induction and training, with an emphasis on procedures and guidance to reduce the risk of water pollution.

Pollution Plans

12.5.8 Plans to deal with accidental pollution would be included within the CEMP prior to commencement of construction.

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

Storage of Materials

12.5.10 The CEMP would incorporate measures set out in the Environment Agency GPP and relevant CIRIA guidance (Ref. 12-30 – Ref. 12-35). Examples of such measures include:

- placing arisings and temporary stockpiles outside of the Flood Zone 3 flood extent and away from drainage systems, and directing surface water away from stockpiles to prevent erosion.;
- containment measures would be implemented, including drip trays, bunding or double-skinned tanks of fuels and oils; all chemicals would be stored in accordance with their Control of Substances Hazardous to Health (COSHH) guidelines (Ref 12-49), whilst spill kits would be provided in areas of fuel/oil storage;
- an Emergency Spillage Plan would be produced, which site staff would have read and understood;
- the mixing and handling of materials would be undertaken in designated areas and away from surface water drains;
- plant and machinery would be kept away from surface water bodies wherever possible and would have drip trays installed beneath oil tanks/engines/gearboxes and hydraulics, which would be checked and emptied regularly. Refuelling and delivery areas would be located away from surface water drains; and
- exposed ground and stockpiles would be protected as appropriate and practicable to prevent windblown migration of potential contaminants. Water suppression would be used, where required, if there is a risk of fugitive dust emissions (see also **Chapter 6**: Air Quality).

Discharge/Disposal of Site Runoff/Material

12.5.11 Plans for the discharge and/or disposal of potentially contaminated water would be agreed in advance with the Environment Agency and other relevant stakeholders, where appropriate, and permits obtained as required.

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

12.5.13 As would be detailed in the CEMP, if any suspected contaminated material is discovered during the works, the contractor would be required to investigate the areas and assess the need for containment or disposal of the material. If material is considered to be contaminated, it would be disposed of to an appropriately licensed facility (also see **Chapter 11:** Ground Conditions and Hydrogeology).

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

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

12.5.16 No discharges from any self-contained wheel wash and localised wheel wash would be permitted to discharge directly into any surface water system.

Temporary Drainage and Settlement

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

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

- installation of measures such as swale(s), silt fences and appropriately sized settlement tank(s)/pond(s) 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 would be regularly cleaned to prevent build-up of dust and mud; and
- all potentially contaminated waters (for example washdown areas, stockpiles and other areas of risk for water contamination) to have separate drainage and where contamination is present, to be tankered away from the Site.

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

Wastewater Generation

12.5.20 A septic tank is likely to be used for treatment of sanitary or domestic wastewater from offices/administration/welfare facilities. This septic tank would be emptied as required and tankered off site to a waste water treatment plant.

Flood Risk

12.5.21 Construction works undertaken adjacent to watercourses would comply with relevant guidance during construction, including the Environment Agency GPP and the requirements of the Trent Valley IDB byelaws, particularly Byelaws 3, 6, 10 and 17.

12.5.22 Construction works within the drainage connection corridors, specifically in areas located within Flood Zone 3, will not be undertaken when an Environment Agency Flood Warning is in place for the River Trent adjacent to the Site. At least one designated Flood Warden will be present on site who is familiar with the risks and remains vigilant to news reports, Environment Agency flood warnings and water levels in the River Trent.

12.5.23 The CEMP would incorporate measures aimed at preventing an increase in flood risk during the construction works. The majority of the Proposed Development is located in Flood Zone 1 and in these areas, specific management pertaining to construction practices and flood risk would not be required. Examples of measures that would be implemented in the Proposed Development areas in Flood Zones 2 and 3 include:

- topsoil and other construction materials would be stored, as far as reasonably practicable, outside of the 1 in 100 year floodplain extent (Flood Zone 3).
- the Applicant would seek to store materials outside of Flood Zone 2 as design of the Proposed Development progresses. ;
- connectivity would be maintained between the floodplain and the River Trent, with no changes in ground levels within the floodplain as far as reasonably practicable;
- the construction laydown area site office and supervisor would be notified of any potential flood occurring by use of the Floodline Warnings Direct service; and
- the Contractor would be required to produce a Flood Risk Management Action Plan/Method Statement which would 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 areas.*

Operation

12.5.24 The operational phase of the Proposed Development would require storage, transport, handling and use of minor volumes of potentially polluting substances (e.g. diesel). Throughout its lifetime, the facility would be regulated by the Environment Agency through an Environmental Permit, which would include conditions relating to handling, storage and use of diesel and other chemicals, including emergency procedures in line with the use of Best Available Techniques (BAT). These measures would be in place to prevent pollution during plant operation in accordance with the permit. An application to vary the existing WBB Power Station Environmental Permit to include the operation of the Proposed Development would be submitted to the Environment Agency for determination in parallel with the Application.

12.5.25 A number of the impact avoidance measures employed during the construction phase would remain for the operational phases of the Proposed Development (where relevant), and would be implemented 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) would be held on Site and all site personnel would be trained in their use, for example the plan would incorporate details on how to appropriately deal with accidental spillages to ensure they are not drained to any surface water system;
- containment measures would be implemented, including bunding or double-skinned tanks for fuels and oils; all chemicals would be stored in accordance with their COSHH guidelines; and
- the oily water drainage system would be incorporated into the design to prevent material entering local waterbodies in accordance with the Outline Drainage Strategy (**Application Document Ref 7.8**).

Contaminated Fire Water

12.5.26 In the event of a fire, the surface water drainage system would be closed to prevent contaminated water being released through surface water drains. Fire water would be contained on Site and either disposed off-site in accordance with waste management legislation (if contaminated) or discharged to surface water in accordance with the Environmental Permit, if the water quality is acceptable for surface water discharge (and subject to agreement with the Environment Agency and/or the Trent Valley IDB). This strategy would prevent pollution of surface and groundwater waterbodies.

Site Drainage

12.5.27 An Outline Drainage Strategy outlining how surface water would be managed post-development has been produced and is presented in **Application Document Ref. 7.8**.

12.5.28 In respect of either the proposed northern or southern drainage connection corridor options, the Outline Drainage Strategy (**Application Document Ref. 7.8**) for the Site comprises a 'tie-in' design into an existing inspection chamber along the purge line that runs approximately parallel with River Road from WBA Power Station cooling towers to the purge line outfall at the sluice gate to the River Trent, near the existing sewage treatment works to the north-east of the Site.

12.5.29 A third option has also been evaluated to connect into the existing WBB Power Station site drainage system to the south of the Proposed Power Plant Site; its feasibility will be dependent on final plant design and the volumes of surface water to be accommodated. This option may include the installation of an oil water separator to the south-east corner of the WBB Power Station site. This drainage route also connects into the WBA Power Station purge line.

12.5.30 The Floods and Water Management Act 2010 (Ref 12-3) places responsibility on local planning authorities, supported by the Environment Agency, to ensure new developments are unlikely to increase overall risk of flooding and requires SuDS criteria to be incorporated into the design. Post-development runoff volumes and rates should therefore be approximate to pre-development equivalent values ('Greenfield runoff').

12.5.31 SuDs standards (Ref 12-25) require that the first choice of surface water disposal should be to discharge to infiltration systems. SuDs systems/units shall also contribute to improving the water quality and sediment control. Attenuation would be achieved by limiting discharge through an appropriate flow attenuation device.

12.5.32 Surface water run-off from the Proposed Development would be restricted to a greenfield run-off rate of 5.0 l/s using a flow control device fixed within a manhole near to the system outfall.

12.5.33 For outline design purposes a 1.0% AEP, 60 minute storm rainfall event has been used to size surface water drainage from the Proposed Development. This ensures that ponding of the Site due to exceedance of the drainage network flow capacity is unlikely to occur during the design life of the Proposed Development.

12.5.34 The drainage design considers the use of an attenuation pond along with other water attenuation methods. An attenuation pond has some advantages over an equivalent buried tank or oversized pipe systems as it permits inspection of flows and maintenance without entry to confined spaces, and may be of ecological/environmental benefit. Maximum attenuation volumes have been calculated for a range of 1.0% AEP storm durations. 1, 2, 6, 10, 24 and 48 hour storm durations have been considered. A climate change factor of 120% has

been applied to rainfall depths in calculation of attenuation volumes. The maximum design attenuation volume would be calculated at the detailed design stage.

12.5.35 The preferred discharge route from any attenuation pond outfall has not been finalised however options under consideration include the northern and southern drainage connection corridors or a connection to the existing West Burton Power Station site drainage system to the south of the Proposed Power Plant Site. This drainage route also connects into the WBA Power Station purge line. The latter option may include the installation of an additional oil water separator to the south-east corner of the WBB Power Station site.

12.5.36 The details set out in the Outline Drainage Strategy (**Application Document Ref. 7.8**) represent an outline drainage design and would be developed through detailed design and in response to requirements identified through the detailed design process.

12.5.37 In addition, the following measures are included in the Outline Drainage Strategy presented as **Application Document Ref. 7.8** and would be considered in the detailed design of the Proposed Development:

- an oily water drainage system will be necessary to serve the gas turbines, fuel delivery area and transformer compound to prevent oil contamination from reaching the surface water drainage system;
- any leakages of lube oil from the turbines to drain will either be captured in a local 'blind' bund (i.e. unconnected to site drainage network) for periodic removal off-site or integrated into the station full retention oily water separator which may be connected to the site drainage system;
- the containment of the road tanker fuel delivery area (**Figure 4.1a** and **Figure 4.1b** in ES Volume III) would be sized as a minimum to capture spillages. Major spillages will be managed either by an appropriately sized oily water separator at the delivery point or integrating the delivery point drains in to the site oily water management system this would have the capacity to contain the discharge from a single failed cell of a road tanker (up to 7,600L maximum);
- any transformers that are oil-cooled will require connection to the oily water system;
- diesel tanks will be appropriately bunded (e.g. containerised emergency diesel generator with double skin leak protection);
- rainwater collected within bunds shall be removed using recognised control procedures that prevent rainwater containing any oils entering the drainage system; and
- periodic maintenance, including de-silting and emptying of collected oil, will be undertaken in order to maintain the intended function of the oily water drainage system.

12.5.38 With the appropriate measures in place and with good housekeeping and management practices adopted and adhered to through compliance with the Environmental Permit, significant impacts to surface water and groundwater as a consequence of site drainage can be avoided.

Flood Risk

12.5.39 The Applicant would subscribe to the Environment Agency's Flood Alert Service in the area.

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

- minimum ground level across the Proposed Power Plant Site would be above the River Trent 1 in 100 year flood level plus a 30% allowance for climate change (i.e. a minimum of 7.10m AOD), secured by a Requirement of the draft DCO (**Application Document Ref 2.1**);
- 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 into the existing West Burton Power Station's emergency response procedures including the recommendation of at least one site operative designated as a Flood Warden for the Proposed Development;
- implementation of a Surface Water Management Strategy; and
- implementation of the oily water drainage system in accordance with the Outline Drainage Strategy (**Application Document Ref 7.8**).

12.5.41 Further details are included within the FRA presented as **Appendix 12A** (ES Volume II).

Decommissioning

12.5.42 The Proposed Development would be subject to decommissioning under the conditions of the Environmental Permit including conditions relating to chemical/polluting material handling, storage and use and emergency procedures in line with BAT. A detailed Decommissioning Environmental Management Plan (DEMP) would be prepared to identify required measures to prevent pollution during this phase of the Proposed Development, based on the detailed decommissioning plan.

12.5.43 The impact avoidance measures for decommissioning would be similar to those identified above for the construction phase. As above, measures would be in place to prevent pollution in accordance with the permit.

12.6 Likely Impacts and Effects

Construction

12.6.1 The groundwater resources and surface watercourses described above (River Trent, Wheatley Beck, Catchwater Drain, and Railway Dyke Drain, Land Drain to North of the Site 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 (taking into account the mitigation measures as detailed in **Section 12.5**.

Surface Water Contaminated Runoff Entering Watercourses and Spillage of Pollutants

12.6.2 During construction, there is an elevated risk of leakage or accidental spillage of construction 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.

12.6.3 The River Trent is turbid in this area, and flood embankments would 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.

12.6.4 Some construction activities could have the potential to create pathways through the subsurface strata and lead to contamination of the underlying Secondary B Aquifer. Piling through contaminated ground, for example, can create a route for pollutants to enter groundwater or a significant accidental discharge of fuel, for example, or a toxic substance would be detrimental to surface water and groundwater receptors and attributes.

12.6.5 Contaminated material exposed or disturbed during the construction works has the potential to affect surface water or groundwater (as discussed in **Chapter 11:** Ground Conditions and Hydrogeology). 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 11:** Ground Conditions and Hydrogeology which should be referred to for further information.

12.6.6 With the measures set out in **Section 12.6** (including the implementation of a CEMP), 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 water attributes are described below.

River Trent

12.6.7 Potential contamination impacts and effects on the River Trent are assessed below:

- Water quality and WFD status (very high importance):
  - possibility of a short-term, measurable but highly localised and temporary change in water quality, assuming a 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 very 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 described in **Section 12.6**.
  - 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).
- Recreation (high importance):
  - there is the possibility of a short-term, localised temporary impact on recreational activity such as walking and river navigation in the unlikely event of a pollution incident, 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).
- Biodiversity (high importance):
  - there is the possibility of a highly localised effect on water quality that could potentially have a short-term, temporary and localised ecological impact, however the impact and effect would be constrained to the area immediately adjacent to the Site (fish, invertebrates of local value etc. being affected from the changes to water quality) and as assessed in **Chapter 9**: Ecology, would not affect the structure or function of the River Trent at this location or more widely. 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 (not significant) (and unlikely to occur based on the impact avoidance measures to be implemented).
  - the predicted effect on river habitats of local value is therefore neutral and not significant.

Wheatley Beck

12.6.8 Potential contamination impacts and effects on Wheatley Beck are assessed below:

- Water quality and WFD status (high importance):
  - possibility of a medium-term, measurable but highly localised and temporary change in water quality, assuming a very worst-case scenario. 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 watercourse and WFD status would be experienced with the implementation of the impact avoidance measures.
  - 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).
- Recreation (medium importance):
  - there exists the potential for a short-term, localised temporary impact on recreational activity such as walking etc., 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 (not significant) (and unlikely to occur based on the impact avoidance measures to be implemented).
- Biodiversity (high importance):
  - there is the possibility of a medium term, 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 high 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).

Catchwater Drain (and associated tributaries)

12.6.9 Potential contamination impacts and effects on Catchwater Drain and associated tributaries are assessed below:

- Water quality and WFD status (high importance):
  - possible short-term, measurable but highly localised and temporary change in water quality, assuming a very worst-case scenario. 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

watercourse and WFD status would be experienced with the implementation of the impact avoidance measures;

- 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).

- Recreation (medium importance):
  - there exists the potential for a short-term, localised temporary impact on recreational activity such as walking etc., 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 (not significant) (and unlikely to occur based on the impact avoidance measures to be implemented).
- Biodiversity (high importance):
  - there is the possibility of a short-term, 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 high 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).

Railway Dyke Drain/Drain to the North of Site

12.6.10 Potential contamination impacts and effects on Railway Dyke Drain/Drain to the north of Site are assessed below:

- Water quality and WFD status (medium importance):
  - possible medium term, measurable but highly localised and temporary change in water quality, assuming a very worst-case scenario. 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 watercourse and WFD status would be experienced with the implementation of the impact avoidance measures;
  - the significance of this effect is therefore considered to be negligible (not significant) (and unlikely to occur based on the impact avoidance measures to be implemented);
- Recreation (low importance):
  - there exists the potential for a short-term, localised temporary impact on recreational activity such as walking etc., 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 (not significant) (and unlikely to occur based on the impact avoidance measures to be implemented);

- Biodiversity (medium importance):
  - there is the possibility of a medium term, 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 (newts, invertebrates etc. being affected from the changes to water quality) and the impact is evaluated to be of low magnitude due to high level of dilution; and
  - the significance of this effect is therefore considered to be negligible (not significant) (and unlikely to occur based on the impact avoidance measures to be implemented).

Additional Identified Surface Water Features

12.6.11 Potential impacts and effects on other surface watercourses from 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 low magnitude; and
  - the significance of this effect is therefore considered to be negligible (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, an impact of low magnitude as a worst-case scenario; and
  - the resulting significance of this effect would be negligible (not significant) (and unlikely to occur based on the impact avoidance measures to be implemented).
- Biodiversity (medium importance):
  - possible localised and temporary ecological impact resulting from the effect on water quality, impact of low magnitude; and
  - the significance of this effect is therefore considered to be negligible (not significant) (and unlikely to occur based on the impact avoidance measures to be implemented).

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

12.6.12 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. 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 re-suspended sediment. Indirect effects could include impacts on invertebrates and fish communities, and destruction of feeding areas, refuges and both breeding and spawning grounds.

12.6.13 Water in the lowland reaches of the River Trent is turbid with suspended sediment, and the flow is generally slack within the reach at the Site due to the naturally low gradient. The River Trent 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.

12.6.14 With the measures set out in **Section 12.6**, including the implementation of a CEMP, the likelihood of this occurring would be very low. Taking this into account, the following effects on different attributes are described below.

River Trent

12.6.15 Potential impacts and effects on the River Trent from suspended sediments are assessed below:

- Water quality and WFD status (very high importance):
  - possible localised and temporary changes in water quality, the potential impact is evaluated to be of very low magnitude given the level of dilution in the watercourse, no effect on water quality and WFD status would be experienced; and
  - the significance of this effect is therefore considered to be minor adverse (not significant), but 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, but given the localised nature, such an impact is evaluated to be of very low magnitude as a worst-case scenario; and
  - 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).

- Biodiversity (high importance):
  - it is possible that the River Trent 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; and
  - 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).

Wheatley Beck

12.6.16 Potential impacts and effects on Wheatley Beck from suspended sediments are assessed below:

- Water quality and WFD status (high importance):
  - possible localised and temporary changes in water quality, the potential impact is evaluated to be of low magnitude given the level of dilution in the watercourse, no effect on water quality and WFD status would be experienced; and
  - the significance of this effect is therefore considered to be minor adverse (not significant) (but unlikely to occur).
- Recreation (medium 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 low magnitude as a worst-case scenario; and
  - the resulting effect would be negligible (not significant).
- Biodiversity (high importance):
  - it is possible that Wheatley Beck 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 low magnitude in the localised area immediately adjacent to the Site; and
  - the significance of this effect is therefore considered to be minor adverse (not significant) (but unlikely to occur).

Catchwater Drain (and associated tributaries)

12.6.17 Potential impacts and effects on Catchwater Drain (and associated tributaries) from suspended sediments are assessed below:

- Water quality and WFD status (high importance):

- possible localised and temporary changes in water quality, the potential impact is evaluated to be of low magnitude given the level of dilution in the watercourse, no effect on water quality and WFD status would be experienced; and
- the significance of this effect is therefore considered to be minor adverse (not significant) (but unlikely to occur).

- Recreation (medium 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 low magnitude as a worst-case scenario; and
  - the resulting effect would be negligible (not significant).
- Biodiversity (high importance):
  - it is possible that Catchwater Drain (and associated tributaries) 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 low magnitude in the localised area immediately adjacent to the Site; and
  - the significance of this effect is therefore considered to be minor adverse (not significant) (but unlikely to occur).

Railway Dyke Drain/Drain to North of Site

12.6.18 Potential impacts and effects on Railway Dyke Drain/Drain to north of Site from suspended sediments are assessed below:

- Water quality and WFD status (medium importance):
  - possible localised and temporary changes in water quality, the potential impact is evaluated to be of low magnitude given the level of dilution in the watercourse, no effect on water quality and WFD status would be experienced; and
  - the resulting effect would be negligible (not significant).
- Recreation (low 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 low magnitude as a worst-case scenario; and
  - the resulting effect would be negligible (not significant).
- Biodiversity (medium importance):
  - it is possible that Railway Dyke Drain/Drain to north of Site could experience a localised and temporary impact with the potential to affect ecology (newts, invertebrates etc., resulting from a change in water

quality). Considering a worst-case scenario, this impact is evaluated to result in an impact of low magnitude in the localised area immediately adjacent to the Site; and

- the resulting effect would be negligible (not significant).

Additional Identified Surface Water Features

12.6.19 Potential impacts and effects on other surface watercourses from 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 low magnitude; and
  - the significance of this effect is therefore considered to be negligible (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, an impact of low magnitude as a worst-case scenario; and
  - the significance of this effect is therefore considered to be negligible (not significant) (and unlikely to occur based on the impact avoidance measures to be implemented).
- Biodiversity (medium importance):
  - possible localised and temporary ecological impact resulting from the effect on water quality, impact of low magnitude; and
  - the significance of this effect is therefore considered to be negligible (not significant) (and unlikely to occur based on the impact avoidance measures to be implemented).

Disturbance of Contaminated Materials

12.6.20 Contaminated material exposed or disturbed during the construction works has the potential to affect surface water or groundwater (as discussed in **Chapter 11:** Ground Conditions and Hydrogeology). 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. Details are provided in **Chapter 11:** Ground Conditions and Hydrogeology, which should be referred to for further information.

Groundwater – Accidental Leakage or Spillage of Pollutants

12.6.21 As discussed in relation to impacts on surface water, during the construction phase there is a low risk of piling (if required) creating pathways for contaminants

to reach groundwater or for leakage or accidental spillage of potential pollutants used during construction, which may then migrate to underlying groundwater (though the impact avoidance measures set out in **Section 12.5** would minimise the risk).

12.6.22 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 would provide limited protection to the Secondary B aquifer (high importance) below however, measures included in **Chapter 11:** Ground Conditions and Hydrogeology and in **Section 12.6** would act to prevent such an incident from occurring. Therefore, it is assumed the impact from an event would be of low magnitude and the significance of effect is assessed as minor adverse (but unlikely to occur) to the Secondary (Undifferentiated) aquifer.

12.6.23 The impact on the water quality and quantity of the shallow groundwater (Secondary A Aquifer of medium importance) would potentially be of medium magnitude, although some attenuation of pollutants would occur in the superficial deposits, and the significance of effect is assessed as minor adverse (but unlikely to occur).

Opening

12.6.24 As discussed in **Section 12.5**, the baseline conditions for the assessed future opening year (earliest Q3 2023) are not expected to be significantly different to the baseline conditions for the construction phase (earliest Q3 2020). The future baseline (operational assessment year in 2027 for WFD objectives and 2063 for flood risk) is considered to provide a worst-case scenario for the operational phase of the Proposed Development and is assessed below.

Operation

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

12.6.26 The Proposed Development would utilise the River Trent in terms of surface water drainage, albeit via the existing drainage connection.

Surface Water – Leakage from Drainage System

12.6.27 An Outline Drainage Strategy has been developed for the Proposed Development, as detailed in **Application Document Ref. 7.8**.

12.6.28 There is minimal contaminated wastewater generated from the Proposed Development during operation. Any uncontaminated surface water would be discharged directly to the River Trent via the drainage connection 'tie in' to WBA purge line in relation to the proposed northern or southern drainage connection corridors, or connect into the existing WBB Power Station site drainage system to

the south of the Proposed Power Plant Site and to the north of WBB. Surface water would drain from the Site at a restricted greenfield rate of 5 l/s with excess runoff above this rate stored in an attenuation pond or tank. Whilst pollution prevention features would be included in the design as set-out in **Section 12.6**, there always remains the potential for leakage from the system to occur (albeit the risk is very low).

12.6.29 The effects of any accidental pollution from site containment systems on different attributes of the identified watercourses are detailed below.

River Trent

12.6.30 Potential impacts and effects on the River Trent from any leakage from the drainage system are assessed below:

- Water quality and WFD status (very high importance):
  - if a leak occurred in the site containment system, considering the dilution potential and current quality of the River Trent, the potential impact would be localised and temporary, and evaluated to be of very low magnitude; and
  - no effect on water quality and WFD status would be experienced, the significance of this effect is therefore considered to be minor adverse (not significant) (but is unlikely to occur based on impact avoidance measures to be implemented).
- 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; and
  - the resulting effect would be negligible (not significant).
- Biodiversity (high importance):
  - it is possible that the River Trent 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; and
  - the significance of this effect is therefore considered to be negligible (not significant).

Wheatley Beck

12.6.31 Potential impacts and effects on Wheatley Beck from any leakage from the drainage system are assessed below:

- Water quality and WFD status (high importance):

- if a leak occurred in the site containment system, considering the importance of the attribute, the potential impact would be localised, temporary and of very low magnitude; and
- the significance of this effect is therefore considered to be negligible (not significant).

- Recreation (medium 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; and
  - the resulting effect would be negligible (not significant).
- Biodiversity (high importance):
  - it is possible that Wheatley Beck 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; and
  - the resulting effect would be negligible (not significant).

Catchwater Drain (and associated tributaries)

- Water quality and WFD status (high importance):
  - if a leak occurred in the site containment system, considering the importance of the attribute, the potential impact on Catchwater Drain (and associated tributaries) would be localised, temporary and of very low magnitude; and
  - no effect on water quality and WFD status would be experienced, the significance of this effect is therefore considered to be negligible (not significant).
- Recreation (medium 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; and
  - no effect on recreation would be experienced, the significance of this effect is therefore considered to be negligible (not significant).
- Biodiversity (high importance):
  - it is possible that Catchwater Drain and its associated tributaries 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; and
  - no effect on biodiversity and WFD status would be experienced, the significance of this effect is therefore considered to be negligible (not significant).

Railway Dyke Drain/Drain to the North of Site

- Water quality and WFD status (medium importance):
  - if a leak occurred in the site containment system, considering the importance of the attribute, the potential impact on the watercourses would be localised, temporary and of very low magnitude; and
  - no effect on water quality and WFD status would be experienced, the significance of this effect is therefore considered to be negligible (not significant).
- Recreation (low 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; and
  - the resulting effect on recreation would be negligible (not significant).

- Biodiversity (medium importance):
  - it is possible that Railway Dyke Drain/Drain to the north of Site could experience a localised and temporary impact with the potential to affect ecology (newts, 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; and
  - no effect on biodiversity and WFD status would be experienced, the significance of this effect is therefore considered to be negligible (not significant).

Additional Identified Surface Water Features

- Water quality and WFD status (low importance):
  - if a leak occurred in the site containment system, considering the importance of the attribute, the potential impact would be localised, temporary and of very low magnitude; and
  - no effect on water quality and WFD status would be experienced, the significance of this effect is therefore considered to be negligible (not significant).
- Recreation (low 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; and
  - the resulting effect on recreation would be negligible (not significant).
- Biodiversity (medium importance):
  - it is possible that the surface water features could experience a localised and temporary impact with the potential to affect ecology (newts, 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; and
  - no effect on biodiversity and WFD status would be experienced, the significance of this effect is therefore considered to be negligible (not significant).

Surface Water – Contamination of Site Runoff

12.6.32 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 measures as described in **Section 12.6** would ensure the risk of contamination of site runoff would be low.

12.6.33 Pollution from runoff of contaminated surface water from the Proposed Development entering a watercourse would cause little change to the River Trent due to the level of dilution in the waterbody.

River Trent

- Water quality and WFD status (very high importance):
  - given the distance from the Site to the River Trent, 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. If, however, a spillage of pollutant did reach the River Trent, or a leak occurred in the site containment system, considering the dilution potential and current quality, the potential impact would be localised and temporary, and evaluated to be of very low magnitude; and
  - no effect on water quality and WFD status would be experienced, the significance of this effect is therefore considered to be minor adverse (not significant) (but is unlikely to occur based on impact avoidance measures to be implemented).
- 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; and
  - the resulting effect would be negligible (not significant).
- Biodiversity (high importance):
  - it is possible that the River Trent 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; and
  - the significance of this effect is therefore considered to be negligible (not significant).

Wheatley Beck

- Water quality and WFD status (high 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 would be designed with attenuation features that have the potential to capture any contaminated runoff for treatment. If, however, a spillage of pollutant did reach Wheatley Beck, or a leak occurred in the site containment system, considering the importance of the attribute, the potential impact would be localised, temporary and of very low magnitude ; and

- the significance of this effect is therefore considered to be negligible (not significant).

- Recreation (medium 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; and
  - the resulting effect would be negligible (not significant).
- Biodiversity (high importance):
  - it is possible that Wheatley Beck 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; and
  - the resulting effect would be negligible (not significant).

Catchwater Drain (and associated tributaries)

- Water quality and WFD status (high importance):
  - any contaminated run off is likely to infiltrate into the surface layers or pond, allowing clean up, prior to reaching the watercourse. The surface drainage system would be designed with attenuation features that have the potential to capture any contaminated runoff for treatment. If, however, a spillage of pollutant did reach Catchwater Drain and its associated tributaries, or a leak occurred in the site containment system, considering the importance of the attribute, the potential impact would be localised, temporary and of very low magnitude; and
  - no effect on water quality and WFD status would be experienced, the significance of this effect is therefore considered to be negligible (not significant).
- Recreation (medium 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; and
  - no effect on recreation would be experienced, the significance of this effect is therefore considered to be negligible (not significant).
- Biodiversity (high importance):
  - it is possible that Catchwater Drain and its associated tributaries 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; and

- no effect on biodiversity and WFD status would be experienced, the significance of this effect is therefore considered to be negligible (not significant).

Railway Dyke Drain/Drain to the North of Site

- Water quality and WFD status (medium importance):
  - any contaminated run off is likely to infiltrate into the surface layers or pond, allowing clean up, prior to reaching the watercourse. The surface drainage system would be designed with attenuation features that have the potential to capture any contaminated runoff for treatment. If, however, a spillage of pollutant did reach Railway Dyke Drain/Drain to the north of Site, or a leak occurred in the site containment system, considering the importance of the attribute, the potential impact would be localised, temporary and of very low magnitude; and
  - no effect on water quality and WFD status would be experienced, the significance of this effect is therefore considered to be negligible (not significant).
- Recreation (low 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; and
  - the resulting effect on recreation would be negligible (not significant).
- Biodiversity (medium importance):
  - it is possible that Railway Dyke Drain/Drain to the north of Site could experience a localised and temporary impact with the potential to affect ecology (newts, 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; and
  - no effect on biodiversity and WFD status would be experienced, the significance of this effect is therefore considered to be negligible (not significant).

Additional Identified Surface Water Features

- Water quality and WFD status (low importance):
  - any contaminated run off is likely to infiltrate into the surface layers or pond, allowing clean up, prior to reaching the watercourse. The surface drainage system would be designed with attenuation features that have the potential to capture any contaminated runoff for treatment. If, however, a spillage of pollutant did reach the land drain, or a leak occurred in the site containment system, considering the importance of the attribute, the

potential impact would be localised, temporary and of very low magnitude; and

- no effect on water quality and WFD status would be experienced, the significance of this effect is therefore considered to be negligible (not significant).

- Recreation (low 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; and
  - the resulting effect on recreation would be negligible (not significant).
- Biodiversity (medium importance):
  - it is possible that the surface water features could experience a localised and temporary impact with the potential to affect ecology (newts, 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; and
  - no effect on biodiversity and WFD status would be experienced, the significance of this effect is therefore considered to be negligible (not significant).

Drainage and Flow to Surface Water and Groundwaters

12.6.34 Uncontaminated surface water discharge would be restricted to greenfield runoff rates and discharged to the River Trent, in line with Environment Agency requirements, via a tie-in to the existing surface water systems on the West Burton Power Station site. The Environmental Permit for the Proposed Development would include provisions for the monitoring of any discharge to demonstrate that it is not contaminated. Therefore effects on the River Trent would be negligible (not significant).

12.6.35 Although the detailed drainage design would not be completed until the detailed design stage, drainage systems would 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.

Flood Risk

12.6.36 The FRA for the Proposed Development, included within **Appendix 12A** (ES Volume II), concludes that development of the Site would not increase the risk of flooding from fluvial, tidal, groundwater or overland flow sources.

12.6.37 An Outline Drainage Strategy has been developed for the Site and is presented in **Application Document Ref. 7.8**. As detailed in the Outline Drainage Strategy and summarised in **Section 12.5** Development Design and Impact Avoidance surface water discharged from the Proposed Development would be restricted to a

greenfield runoff rate of 5 l/s via an attenuation pond or similar and appropriate flow control.

12.6.38 Whichever of the three drainage options is selected, surface water from any attenuation pond or tank would outfall, via new drainage infrastructure, into the purge line that runs approximately parallel with River Road from WBA Power Station cooling towers to the purge line outfall at the sluice gate to the River Trent near the existing sewage treatment works to the north-east of the Site.

12.6.39 For outline design purposes a 1% AEP, 60 minute storm rainfall event with a 20% climate change allowance has been used to size surface water drainage for the Proposed Development. This ensures that ponding of the Site due to exceedance of drainage network flow capacity is unlikely to occur during the design life of development.

12.6.40 The Site would 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 would be diverted away from critical infrastructure or access routes and retained on the Site wherever possible.

12.6.41 Other SuDS techniques such as permeable paving and soakaways may be considered at the detailed design stage.

Groundwater

12.6.42 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 would include a condition to prevent any deterioration of land or groundwater during the operational phase of the Proposed Development.

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

12.6.44 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 (not significant).

Decommissioning

12.6.45 Decommissioning of the Proposed Development would be undertaken in accordance with the Environmental Permit. This would include decommissioning

of all potentially polluting plant and equipment so that it does not pose an unacceptable risk of contamination.

12.6.46 It is assumed that all underground infrastructures would remain in-situ, however, all connection and access points would be sealed or grouted to ensure disconnection.

12.6.47 On this basis, decommissioning impacts are expected to be limited to watercourses/groundwater bodies in close proximity to the Site and would be broadly similar to construction impacts, as discussed above.

Summary of Potential Impacts on WFD Status

12.6.48 The WFD status of the River Trent, Wheatley Beck and Catchwater Drain has been considered for each of the potential impacts described as part of this assessment.

12.6.49 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 **Section 12.6** would be effectively implemented, there would be no effect on WFD status and objectives.

12.6.50 Mitigation measures already in place on the River Trent, Wheatley Beck and Catchwater Drain include the strategic management of sediment, bank rehabilitation, reducing impact of dredging and reducing sediment suspension.

12.6.51 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.

12.6.52 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 the River Trent, Wheatley Beck and Catchwater Drain is therefore likely to be negligible (not significant).

12.7 Mitigation and Enhancement Measures

12.7.1 A number of legislative and best practice measures which would be followed during the construction, opening and operation and decommissioning of the Proposed Development are detailed in **Section 12.6**. The design and impact avoidance measures have been taken into account in the assessment and no additional mitigation requirements have been identified.

12.8 Limitation or Difficulties

12.8.1 The following assumptions have been applied throughout this assessment process, but are not considered to significantly affect the robustness of the assessment:

- a conceptual design for the Proposed Development has been available, but detailed design would not be undertaken until after the consenting process has been concluded – however, it is unlikely that detailed design would change the outcome of the assessment; therefore, the Rochdale Envelope applied (see **Chapter 4**: The Proposed Development) has no effect on the assessment of flood risk, hydrology and water resources;
- similarly as no details of construction techniques are available, it is assumed that standard construction techniques would be used; and
- it is assumed that the mitigation measures identified in **Chapters 6** to **16** of this ES would be implemented, which could influence the mitigation strategy proposed by this chapter.

12.8.2 Hydrological and hydraulic information for minor local watercourses (ordinary watercourses and IDB drains/watercourses) in the vicinity of the Site is limited; therefore the assessment is based on professional judgement together with information taken from mapping, publically available data sources and local knowledge gained through consultation with statutory consultees.

12.9 Summary of Likely Significant Residual Effects

12.9.1 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 Trent, Wheatley Beck and Catchwater Drain, Railway Dyke Drain/Drain north of the Site, minor watercourses and drainage ditches, other identified water features and groundwater. A summary of the impact assessment findings is provided in **Table 12-8**.

12.9.2 As no mitigation measures additional to those described within **Section 12.6** have been identified, the residual effects remain as described in **Section 12.7**. 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, operation and decommissioning of the Proposed Development.

Table 12-8: Summary of likely significant residual effects

Predicted Impact	Sensitivity of resource/receptor	Mitigation	Magnitude of impact	Classification of residual effect
Construction				
Contaminated runoff and spillage of pollutants polluting the River Trent	Water Quality – Very High	No additional mitigation required - see **Section 12.6**.	Very Low	Minor Adverse (not significant)
	Recreation – High		Low	Minor Adverse (not significant)
	Biodiversity – High		Very Low	Negligible (not significant)
Contaminated runoff and spillage of pollutants polluting Wheatley Beck	Water Quality –High	No additional mitigation required - see **Section 12.6**.	Low	Minor Adverse (not significant)
	Recreation – Medium		Low	Negligible (not significant)
	Biodiversity – High		Low	Minor Adverse (not significant)
Contaminated runoff and spillage of pollutants polluting Catchwater Drain (and associated tributaries)	Water Quality – High	No additional mitigation required - see **Section 12.6**.	Low	Minor Adverse (not significant)
	Recreation – Medium		Low	Negligible (not significant)
	Biodiversity – High		Low	Minor Adverse (not significant)

Predicted Impact	Sensitivity of resource/receptor	Mitigation	Magnitude of impact	Classification of residual effect
Contaminated runoff and spillage of pollutants polluting Railway Dyke Drain/Drain to the North of Site	Water Quality – Medium	No additional mitigation required - see **Section 12.6**.	Low	Negligible (not significant)
	Recreation – Low		Low	Negligible (not significant)
	Biodiversity – Medium		Low	Negligible (not significant)
Contaminated runoff and spillage of pollutants polluting Additional Identified Water Features	Water Quality – Low	No additional mitigation required - see **Section 12.6**.	Low	Negligible (not significant)
	Recreation – Low		Low	Negligible (not significant)
	Biodiversity – Medium		Low	Negligible (not significant)
Suspended sediments in site runoff/Re-suspension of Sediments polluting the River Trent	Water Quality – Very High	No additional mitigation required - see **Section 12.6**.	Very Low	Minor Adverse (not significant)
	Recreation – High		Very Low	Negligible (not significant)
	Biodiversity – High		Very Low	Negligible (not significant)
Suspended sediments in site runoff/ Re-suspension of Sediments polluting Wheatley Beck	Water Quality – High	No additional mitigation required - see **Section 12.6**.	Low	Minor Adverse (not significant)
	Recreation –		Low	Negligible (not

Predicted Impact	Sensitivity of resource/receptor	Mitigation	Magnitude of impact	Classification of residual effect
	Medium			significant)
	Biodiversity – High		Low	Minor Adverse (not significant)
Suspended sediments in site runoff/ Re-suspension of Sediments polluting Catchwater Drain (and associated tributaries)	Water Quality – High	No additional mitigation required - see **Section 12.6**.	Low	Minor Adverse (not significant)
	Recreation – Medium		Low	Negligible (not significant)
	Biodiversity – High		Low	Minor Adverse (not significant)
Suspended sediments in site runoff/ Re-suspension of Sediments polluting Railway Dyke Drain/Drain to the North of Site	Water Quality – Medium	No additional mitigation required - see **Section 12.6**.	Low	Negligible (not significant)
	Recreation – Low		Low	Negligible (not significant)
	Biodiversity – Medium		Low	Negligible (not significant)
Suspended sediments in site runoff/ Re-suspension of Sediments polluting Additional Identified Water Features	Water Quality – Low	No additional mitigation required - see **Section 12.6**.	Low	Negligible (not significant)
	Recreation – Low		Low	Negligible (not significant)
	Biodiversity – Medium		Low	Negligible (not significant)

Predicted Impact	Sensitivity of resource/receptor	Mitigation	Magnitude of impact	Classification of residual effect
Disturbance of Contaminated Materials	Shallow Groundwater Vulnerability – Medium	No additional mitigation required - see **Section 12.6**.	Low	Negligible (not significant)
	Deep Groundwater Vulnerability – High		Very Low	Negligible (not significant)
Accidental leakage or spillage of pollutants polluting groundwater	Shallow Groundwater Vulnerability – Medium	No additional mitigation required - see **Section 12.6**.	Medium	Minor Adverse (not significant)
	Deep Groundwater Vulnerability – High		Low	Minor Adverse (not significant)
Opening/Operation				
Leakage from drainage system polluting the River Trent	Water Quality – Very High	No additional mitigation required - see **Section 12.6**.	Low	Minor Adverse (not significant)
	Recreation – High		Very Low	Negligible (not significant)
	Biodiversity – High		Very Low	Negligible (not significant)
Leakage from drainage system polluting Wheatley Beck	Water Quality – High	No additional mitigation required - see **Section 12.6**.	Very Low	Negligible (not significant)
	Recreation –		Very Low	Negligible (not

Predicted Impact	Sensitivity of resource/receptor	Mitigation	Magnitude of impact	Classification of residual effect
	Medium			significant)
	Biodiversity – High		Very Low	Negligible (not significant)
Leakage from drainage system polluting Catchwater Drain (and associated tributaries)	Water Quality – High	No additional mitigation required - see **Section 12.6**.	Very Low	Negligible (not significant)
	Recreation – Medium		Very Low	Negligible (not significant)
	Biodiversity – High		Very Low	Negligible (not significant)
Leakage from drainage system polluting Railway Dyke Drain/Drain to the North of Site	Water Quality – Medium	No additional mitigation required - see **Section 12.6**.	Very Low	Negligible (not significant)
	Recreation – Low		Very Low	Negligible (not significant)
	Biodiversity – Medium		Very Low	Negligible (not significant)
Leakage from drainage system polluting Additional Identified Water Features	Water Quality – Low	No additional mitigation required - see **Section 12.6**.	Very Low	Negligible (not significant)
	Recreation – Low		Very Low	Negligible (not significant)
	Biodiversity – Medium		Very Low	Negligible (not significant)

Predicted Impact	Sensitivity of resource/receptor	Mitigation	Magnitude of impact	Classification of residual effect
Contaminated runoff and spillages of pollutants polluting the River Trent	Water Quality – Very High	No additional mitigation required - see **Section 12.6**.	Very Low	Minor Adverse (not significant)
	Recreation – High		Very Low	Negligible (not significant)
	Biodiversity – High		Very Low	Negligible (not significant)
Contaminated runoff and spillages of pollutants polluting Wheatley Beck	Water Quality – High	No additional mitigation required - see **Section 12.6**.	Very Low	Negligible (not significant)
	Recreation – Medium		Very Low	Negligible (not significant)
	Biodiversity – High		Very Low	Negligible (not significant)
Contaminated runoff and spillages of pollutants polluting Catchwater Drain (and associated tributaries)	Water Quality – High	No additional mitigation required - see **Section 12.6**.	Very Low	Negligible (not significant)
	Recreation – Medium		Very Low	Negligible (not significant)
	Biodiversity – High		Very Low	Negligible (not significant)
Contaminated runoff and spillages of pollutants polluting Railway Dyke Drain/Drain to the North of Site	Water Quality – Medium	No additional mitigation required - see **Section 12.6**.	Very Low	Negligible (not significant)
	Recreation – Low		Very Low	Negligible (not

Predicted Impact	Sensitivity of resource/receptor	Mitigation	Magnitude of impact	Classification of residual effect
				significant)
	Biodiversity – Medium		Very Low	Negligible (not significant)
Contaminated runoff and spillages of pollutants polluting Additional Identified Water Features	Water Quality – Low	No additional mitigation required - see **Section 12.6**.	Very Low	Negligible (not significant)
	Recreation – Low		Very Low	Negligible (not significant)
	Biodiversity – Medium		Very Low	Negligible (not significant)
Accidental leakage or spillage of pollutants polluting groundwater	Shallow Groundwater Vulnerability – Medium	No additional mitigation required - see **Section 12.6**.	Low	Negligible (not significant)
	Deep Groundwater Vulnerability – High		Very Low	Negligible (not significant)
Potential impact on WFD status		No additional mitigation required - see **Section 12.6**.		No effect (not significant)
Decommissioning – considered to be same as construction stage as detailed above				

12.10 References

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