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11.0 BIODIVERSITY AND NATURE CONSERVATION

11.1 Introduction

11.1.1 This chapter of the Environmental Statement (ES) addresses the potential effects of the construction, operation (including maintenance) and decommissioning of the Proposed Development on biodiversity and nature conservation. The assessment considers:

- the present-day and future baseline conditions during construction and at opening;
- the effects of construction of the Proposed Development on nature conservation designations, habitats and species;
- the effects of the operation of the Proposed Development on nature conservation designations, habitats and species; and
- the potential effects of the eventual decommissioning of the Proposed Development.

11.1.2 Due to the interdisciplinary nature of effects, this chapter cross references other chapters including **Chapter 8**: Air Quality, **Chapter 9**: Noise and vibration and **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**) and is supported by the following technical appendices provided in ES Volume II (**Application Document Ref. 6.3)** which include a number of biodiversity and nature conservation figures relevant to this chapter:

- **Appendix 11A** – Legislation and Planning Policy;
- **Appendix 11B** – Ecological Impact Assessment Methodology;
- **Appendix 11C** – Preliminary Ecological Appraisal Report;
- **Appendix 11D** – Confidential Badger Survey Report;
- **Appendix 11E** – Bat Survey Report;
- **Appendix 11F** – Riparian Mammal Survey Report;
- **Appendix 11G** – Aquatic Ecology Survey Report; and
- **Appendix 11H** – Underwater Sound Effects on Fish.

11.1.3 **Figure 11.1**: Statutory Nature Conservation Designations and **Figure 11.2**: Non-Statutory Nature Conservation Designations accompany this chapter and are presented in ES Volume III (**Application Document Ref. 6.4**).

11.1.4 The cumulative effects of emissions associated with the Proposed Development and other committed developments in the vicinity are described in **Chapter 19**: Cumulative and Combined Effects (ES Volume I - **Application Document Ref. 6.2**).

11.2 Legislation, Planning Policy and Guidance

11.2.1 The ecological impact assessment (EcIA) presented in this chapter has been undertaken within the context of relevant planning policies, guidance documents and legislative instruments. A summary is provided below, and further details are provided in **Appendix 11A** (ES Volume II - **Application Document Ref. 6.3**).

Legislative Background

Biodiversity and Nature Conservation Legislation

11.2.2 The following legislation is potentially relevant to the Proposed Development:

- The Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations');
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (WFD);
- Wildlife and Countryside Act 1981 (as amended) (the WCA);
- The Hedgerow Regulations 1997;
- Countryside and Rights of Way (CRoW) Act 2000 (as amended);
- Natural Environment and Rural Communities (NERC) Act 2006 (as amended);
- Protection of Badgers Act 1992 (as amended);
- Animal Welfare Act 2006;
- Wild Mammals (Protection) Act 1996;
- The Eels (England and Wales) Regulations 2009 (as amended);
- Salmon & Freshwater Fisheries Act 1975 (as amended);
- Environmental Protection Act 1990;
- Invasive Alien Species (Enforcement and Permitting) Order 2019; and
- Marine and Coastal Access Act 2009.

Planning Policy Context

National Planning Policy

11.2.3 The relevant Government policy for delivery of major energy infrastructure is set out in the following two relevant National Policy Statements (NPS).

11.2.4 The Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011a) sets out national policy for energy infrastructure. Where the development is subject to EIA, the applicant should ensure that

the assessment clearly sets out any effects on European Sites, other national and local nature conservation designations, protected species and habitats and other species identified as being of principal importance for the conservation of biodiversity. It also requires that the Applicant shows how the project has taken advantage of opportunities to conserve and enhance biodiversity conservation interests.

11.2.5 The NPS for Fossil Fuel Electricity Generating Infrastructure (EN-2) (DECC, 2011b) provides relevant advice on the applicant's assessment and mitigation measures. Table 11.1 provides a summary of relevant NPS policy regarding biodiversity and explains where matters are assessed within this chapter.

Table 11.1: Summary of NPS advice relevant to biodiversity

Summary of NPS	Consideration within the Chapter
NPS EN-1	
Paragraph 5.3.3 states: "Where the development is subject to EIA the applicant should ensure that the ES clearly sets out any effects on internationally [i.e. European Sites], nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity."	Section 11.6
Paragraph 5.3.4 states: "The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests."	Sections 11.5 and 11.7
Paragraph 5.3.7 states: "As a general principle, and subject to the specific policies below, development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives (as set out in Section 4.4 above); where significant harm cannot be avoided,	Sections 11.5 and 11.7

Summary of NPS	Consideration within the Chapter
NPS EN-1	
then appropriate compensation measures should be sought."	
Paragraph 5.3.18 states: "The applicant should include appropriate mitigation measures as an integral part of the proposed development. In particular, the applicant should demonstrate that: • during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works; • during construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements; • habitats will, where practicable, be restored after construction works have finished; and • opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals."	Sections 11.5 and 11.7 and **Application Document Ref. 5.10**: The Landscaping and Biodiversity Management and Enhancement Plan
NPS EN-2	
Paragraph 2.10.2 notes that "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 water."	**Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**) and Section 11.5.

Summary of NPS	Consideration within the Chapter
NPS EN-1	
In addition to the mitigation measures set out in EN-1, design of the cooling system should include intake and outfall locations that avoid or minimise adverse impacts. There should also be specific measures to minimise fish impingement and/or entrainment and excessive heat from discharges to receiving waters	**Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**) and Section 11.5.

Marine Planning Policy

11.2.6 The Marine Policy Statement (MPS) (Defra, 2011) provides a framework for taking decisions affecting the marine environment, which includes the River Trent at Keadby. All public authorities taking authorisation or enforcement decisions that affect or might affect the UK marine area are to do so in accordance with the MPS unless relevant considerations indicate otherwise, and applications for Nationally Significant Infrastructure Projects (NSIP) are required to have regard to the MPS.

11.2.7 Policies ECO1, ECO2, BIO1, BIO2 and MPA1 of the Eastern Inshore Marine Plan (Defra, 2014) are relevant considerations as these set out requirements in regard to cumulative impacts affecting the ecosystem of the Marine Plan and adjacent marine and terrestrial areas, releases of hazardous substances, protection and enhancement of biodiversity, and requirements to address strategic objectives for maintenance of an ecologically coherent network.

National Planning Policy Framework

11.2.8 The policies set out in the revised National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, (MHCLG) 2019) are not specific to NSIP projects but may be important and relevant matters for DCO decision making. The NPPF sets out the Government's planning policies for England and how these are expected to be applied. It identifies overarching environmental objectives such as protecting and enhancing our natural environment, minimising impacts on and improving biodiversity and securing measurable net gains for biodiversity (paragraph 174b) The NPPF introduces additional considerations including definitions of and requirements in relation to irreplaceable habitats which must be addressed in the development design and assessment process. Further

information on the relevant parts of the NPPF is provided within **Appendix 11A** (ES Volume II - **Application Document Ref. 6.3**).

Local Development Plan Policy

11.2.9 The Proposed Development is located in North Lincolnshire Council. Therefore, the following planning policies are potentially relevant to the Proposed Development:

- Policy CS17 of the North Lincolnshire Council Local Development Framework Core Strategy adopted 2011 (North Lincolnshire Council, 2011), which sets out requirements to achieve effective stewardship of the biodiversity of North Lincolnshire; and
- Saved Policies LC1, LC2, LC4, LC5, LC6 and LC12 of the North Lincolnshire Local Plan adopted 2003 (North Lincolnshire Council, 2003a), which set out requirements in regard to nature conservation designations, species and habitats.

11.2.10 There is also emerging policy as NLC is preparing a new Local Plan to 2036 (North Lincolnshire Council, 2020). Once formally adopted, it will replace the current North Lincolnshire Local Plan and the Core Strategy. NLC undertook their Regulation 18 'Preferred Options' consultation between February and March 2020. The policies consulted on and of potential relevance to biodiversity and nature conservation are:

- Policy DQE3p: Biodiversity and Geodiversity, which updates requirements to achieve effective stewardship of the biodiversity of North Lincolnshire, including nature conservation designations, sites that meet criteria for the selection of Local Wildlife Sites (LWS), habitats and species; and
- Policy DQE8p: Climate Change and Low Carbon Living, which expects that all development proposals should be resilient to climate change and decrease the negative impacts of climate change on neighbouring areas, including through incorporation, where feasible, of multi-functional green infrastructure, which can help species adapt to climate change through preventing fragmentation or isolation of habitats.

11.2.11 Further information on the above relevant policies is provided within **Appendix 11A** (ES Volume II - **Application Document Ref. 6.3**).

Other Guidance

11.2.12 Additional guidance of potential relevance to the Proposed Development and/ or for interpretation of the above planning policy is given in the following documents:

- North Lincolnshire Supplementary Planning Guidance (SPG) 3: Design in the Countryside, which sets out additional considerations in relation to landscape plantings and biodiversity protection and enhancement (North Lincolnshire Council (2003b);
- Biodiversity 2020: A strategy for England's wildlife and ecosystem services (Department for Environment, Food and Rural Affairs (Defra), 2011);
- Lincolnshire Biodiversity Action Plan (Lincolnshire Biodiversity Partnership, 2011);
- Standing Advice issued by Defra, Natural England and the Forestry Commission; and
- National Character Area Profile 39 (NE339) Humberhead Levels (Natural England, 2014).

11.3 Assessment Methodology

Consultation

11.3.1 The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised via the formal Scoping Opinion (**Appendix 1B** (ES Volume II - **Application Document Ref. 6.3**)) and in response to the formal consultation and other pre-application engagement is summarised in Table 11.2.

Table 11.2: Consultation summary table

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
Planning Inspectorate	Scoping opinion (June 2020)	The ES should assess vibration impacts to ecological receptors where significant effects are likely to occur.	Potential noise and vibration impacts are considered and assessed (where relevant) with reference to the findings of **Chapter 9**: Noise and Vibration (ES Volume I – **Application Document Ref. 6.2**).
		The ES should detail how the baseline has been established within an appropriate study area and include a list of sources used and/or the location, extent, data and results of any surveys undertaken to inform the baseline, supported by figures where appropriate. Effort should be made to agree the approach with relevant consultation bodies.	The approach to be taken was set out in the scoping report reviewed and commented on by stakeholders for the scoping opinion. Further detail to meet the requirements of the Planning Inspectorate is provided in this chapter and its supporting technical appendices.

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		The ES should establish an appropriate study area based on the ZOI, and the assessment should include all potential sensitive receptors within the ZOI and assess all impacts that are likely to cause significant effects.	This is provided in this chapter and its supporting technical appendices.
		The ES should assess air quality impacts on ecology (e.g. nitrogen deposition).	Potential air quality impacts are considered and assessed (where relevant) with reference to the findings of **Chapter 8**: Air Quality (ES Volume I – **Application Document Ref. 6.2**).
		The Inspectorate notes that spatial extent, probability and frequency should also be considered in determining impacts in the ES. The ES Ecology Chapter should include a methodology determining how significance is defined with reference to applicable guidance used to inform the assessment. Effort should be made to agree the approach with the relevant consultation bodies.	The scoping report identified that assessment would be made in accordance with current guidance, including CIEEM (2019) methods. This approach was reviewed and commented on by stakeholders for the scoping opinion. The methods used are

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			provided in this chapter and its supporting technical appendices (**11B – 11G** in ES Volume II – **Application Document Ref. 6.3**).
		Where piling is required, the ES should assess potential impacts from piling on ecological receptors.	Potential piling impacts have been considered based on the details of this provided in **Chapter 5**: Construction Programme and Management (ES Volume I - **Application Document Ref. 6.2**) and are assessed (where relevant) with reference to the preliminary findings reported within **Chapter 9**: Noise and Vibration, and **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**).

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		The ES should assess potential impacts from dredging on receptors.	No dredging is proposed to permit construction or operation of the Proposed Development.
		Dependent on the timing footprint and nature of the works, further sediment sampling may be required closer to the commencement of the works and this should include for metal samples, Polyaromatic Hydrocarbons (PAHs) and Organochlorides (OCs). Effort should be made to agree an approach to sediment sampling with the MMO and any other relevant consultation bodies.	Refer to **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**).
		The Inspectorate is content to scope out great crested newt surveys subject to evidence of the agreed approach with Natural England.	Appropriate consideration has been given to great crested newt. Natural England was consulted for the scoping opinion and had the opportunity to review the rationale for scoping out great crested newt. No comments in relation to this were

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			made. North Lincolnshire Council has confirmed agreement with the approach taken in their response to Stage 2 formal consultation.
		The ES should determine whether the Proposed Development could impact any nearby buildings based on the ZOI and whether these have bat roost potential. The ES should assess impacts to bat roosts where significant effects are likely to occur.	This has been considered. Construction will not affect any existing buildings and no demolition is proposed. The scoping of bat survey requirements is provided in **Appendix 11C**: Preliminary Ecological Appraisal Report (ES Volume II - **Application Document Ref. 6.3**).

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		The Inspectorate notes that the ZOI and works to be carried out are currently unknown and it is unclear whether these species could still be impacted. Therefore, the Inspectorate does not agree with scoping out these surveys and advises that the ES should assess impacts to these receptors where significant effects are likely to occur.	The required information is provided in this chapter and its supporting technical appendices.
		The Inspectorate does not agree to scope out aquatic surveys from the ES due to inadequate detail on what construction works are proposed in the aquatic environment. The ES should be informed by suitably detailed and up to date aquatic information to establish a robust and up to date aquatic ecology baseline. The ES should detail surveys conducted and the results. The construction activities associated with the Proposed Development should be included in the ES and any impacts to aquatic receptors where significant effects are likely to occur should be	An appropriate suite of aquatic biodiversity surveys has been completed to enable assessment of the potential impacts of Proposed Development. These surveys were scoped after first considering existing data sources and reasonable assumptions on the likely presence/ absence of relevant aquatic species. Further detail is provided

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		assessed. Effort should be made to agree the approach with relevant consultation bodies.	in **Appendix 11C**: Preliminary Ecological Appraisal Report and **Appendix 11G**: Aquatic Ecology Survey Report (ES Volume II - **Application Document Ref. 6.3**).
		The ES should clearly set out whether terrestrial and aquatic ecology are assessed as one or two aspects and identify which receptors are assessed within each Chapter; cross-referencing should be employed to enable understanding and effort should be made to agree an approach with relevant consultation bodies.	The EcIA presented in this chapter considers all terrestrial, freshwater and marine ecological features of potential relevance to the Proposed Development as described in **Chapter 4**: Proposed Development and **Chapter 5**: Construction Programme and Management (ES Volume I - **Application Document Ref. 6.2**).
Natural England	Scoping opinion (10th June 2020)	Advice provided on the scope of the EIA.	This chapter is consistent with the guidance provided in relation to

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			biodiversity and nature conservation.
MMO	Scoping opinion (15th June 2020)	The MMO notes that aquatic surveys must not be scoped out of this assessment at this stage. More specificity on the types of surveys to be undertaken is required. The need for surveys should be reviewed based on whether any rare or designated aquatic species have been found in the vicinity of the project.	A relevant suite of aquatic surveys has been completed. The scoping decisions taken are explained in **Appendix 11C**: Preliminary Ecological Appraisal, with additional information in **Appendix 11G:** Aquatic Ecology Survey Report (ES Volume II - Application **Document Ref. 6.3**).
North Lincolnshire Council	Late response to scoping opinion (26th June 2020)	Supports the proposed scope of the ecological assessment. Notes that appropriate surveys have been or will be carried out. Use of survey data from 2017 is broadly acceptable if it remains reliable.	No response required.
Canal and River Trust	Scoping opinion (5th June 2020)	Identify scope for biodiversity enhancement next to the canal to provided screening from the Proposed Development.	Requirements for landscape screening are assessed and specified in **Chapter 14:** Landscape

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			and Visual Amenity (ES Volume I - **Application Document Ref. 6.2**). Proposals for landscape and biodiversity enhancement are provided as a standalone LBMEP to accompany the DCO Application (**Application Document Ref. 5.10**).
Environment Agency	Scoping opinion (12th June 2020)	Comment that water vole surveys undertaken in June 2019 identified an extensive water vole population in the drainage ditches surrounding the site. The ES should include an understanding of the water vole population and a mitigation strategy to prevent its fragmentation. Comment that grass snakes were also recorded during surveys of June 2019 and the EA expect implementation of avoidance measures to safeguard reptiles that come onto site. These	This data has been obtained and considered. All watercourses relevant to the Proposed Development were surveyed in 2020 (**Appendix 11F**: Riparian Mammal Survey Report, ES Volume II - **Application Document Ref. 6.3**) and this represents the most current dataset for these watercourses.

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		measures will be documented in a reptile method statement.	The relevance of grass snake is considered and addressed in this chapter and **Appendix 11C**: PEA Report (ES Volume II - **Application Document Ref. 6.3**).
		The Environment Agency advises that any water abstraction will require fish screening to protect all species, especially designated species (e.g. lamprey and eel). Discharge water will be within UK TAG guidance	The Proposed Development will provide appropriate eel and fish screening based on parameters advised by the Environment Agency (see **Chapter 4**: The Proposed Development (ES Volume I - **Application Document Ref. 6.2**). The quality of discharge waters will meet all legal and regulatory requirements regulated by the Environmental Permit required for operation of

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			the Proposed Development.
		Opportunities to incorporate biodiversity in and around development are encouraged. An assessment of the impact of the development on the terrestrial habitat, hedgerows and river corridor categories should be made in the ES. The Defra Biodiversity Metric 2.0 can be used to calculate at least 10% net gain in each of the impacted categories.	Proposals to demonstrate that the Proposed Development can deliver no net loss and a gain in biodiversity are set out in the LBMEP **(Application Document Ref. 5.10**). Currently, there is no legal or planning policy requirement to achieve a specific percentage net gain for NSIP. The proposed approach has been discussed with North Lincolnshire Council.
Natural England (NE)	January 2021 (Stage II Consultation / PEI Report)	Recommends that cofferdam installation and removal are carried out outside of lamprey migration periods. Recommends that an estimation of the length of time that the cofferdams will be in-situ should be provided to enable assessment of the potential impacts	The approach to the use of cofferdams is explained in **Chapter 5**: Construction Programme and Management and **Chapter 12:** Water Environment and Flood

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		over time, i.e. scour and erosion. Noting mention of "other bank protection mitigation can also be applied to further reduce the potential for erosion and scour impacts". Natural England advises that further information be provided on when it would be appropriate to use these additional bank protection mitigation measures. Lamprey may occur year round as migration downstream to the estuary/sea occurs when they are a certain size c.15cm, rather than age. Sufficient assessment should be provided to demonstrate consideration of: • potential barrier effects; • risk of impingement/entrainment; and • in combination effects of extracting/discharging large volumes of water multiple times within c.300m.	Risk (ES Volume I - **Application Document Ref. 6.2**). The ecological assessment is based on these parameters. Water intakes would be screened to comply with the Eel Regulations 2009 as described in **Chapter 4**: The Proposed Development (ES Volume I – **Application Document Ref. 6.2**). It is anticipated that this will incorporate a 2mm mesh size which provides adequate incidental screening for lamprey also. Water abstraction rates proposed would be below the escape velocity of lamprey species, again preventing impingement and entrainment. Potential barriers to lamprey

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		Evidence should be provided on the effectiveness of the eel screens in limiting impingement/entrainment to ensure minimal mortality rates of lamprey. If water abstraction/ discharge takes place via the Canal. Natural England is of the opinion that the same screening considerations to that of the river abstraction should take place. Natural England notes that the application site is near the Humber Estuary SSSI. Based on the plans submitted, Natural England considers that the proposed development could have potential significant effects on the interest features for which the site has been notified. Water vole - water vole displacement should be implemented where work will impact sections of watercourse used by	movement have been considered and assessed. A similar approach to screening to comply with the Eels Regulations is proposed for the preferred intake from the canal, as described in **Chapter 4**: The Proposed Development (ES Volume I – **Application Document Ref. 6.2**). Lamprey species are not likely to use the canal given their ecological needs and existing barriers. Potential impacts and effects on the Humber Estuary SSSI are considered and assessed in this Chapter.

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		water vole. The developer should ensure adjacent areas provide suitable water vole habitat prior to displacement. A licence for this activity should be secured prior to commencement of development. The habitat enhancement measures are welcomed and should be further detailed within the LBMEP. Bats – the PEA found two trees with attached bat boxes. The developer should clarify whether these trees are to be retained on site as part of the development. Badgers - works within 30m of the sett will only be allowed to be carried out between July and November, outside of the breeding season. Due to the proximity of the development site to a main badger sett the developer will be required to seek out a licence with Natural England prior to any works commencing where there is a possibility of disturbance to badgers using the sett. Natural England supports the implementation of general	This chapter assesses the potential impact on water vole. No significant effects are likely and the committed update surveys, mitigation and habitat enhancement further support this conclusion. Related matters are also addressed in the LBMEP (**Application Document Ref. 5.10**). The PEA report (**Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**)) confirms that trees supporting bat boxes will be retained. These trees are not within the land required for construction and operation of the Proposed Development.

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		good practice measures to prevent badgers and other ground dwelling animals from becoming trapped in excavated pits. Birds - notes the PEA Report identifies that willow tit and little ringed plover use the adjacent Keadby Ash Tip. The developer is advised to speak to the ecologist at the local authority to ensure there is not a net loss of habitat for these species due to the development and to identify how habitat mitigation can be incorporated into the ecological enhancement area. Local sites and priority habitats and species - the PEA Report identified Keadby Boundary Drain to the North of the development site as an LWS. The developers should contact the ecologist at the local authority to determine what measures should be implemented to safeguard this site during the construction and operation of the	This chapter acknowledges legal requirements in relation to badger. While the current assessment concludes that adverse impacts on badger can be avoided (given the locations of existing setts) this will be reviewed pre-construction in accordance with the measures set out in confidential **Appendix 11D** (ES Volume II - **Application Document Ref. 6.3**) and the LBMEP (**Application Document Ref. 5.10**). This chapter and the PEA report (**Appendix 11C**, ES Volume II - **Application Document Ref. 6.3**) clarifies the

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		development. NE notes that open mosaic habitat and acid grassland priority habitats have been identified around the former Keadby ash tip. The footprint of the proposed development avoids these areas; however, they are in proximity, therefore if any potential mitigation and/or enhancement measures are provided, these should be further detailed within the LBMEP.	relevance of willow tit and little ringed plover. No likely significant effects are predicted given their habitat associations. The County Ecologist has been consulted. Habitat enhancement for willow tit is proposed within the LBMEP (**Application Document Ref. 5.10**). Impacts on all relevant terrestrial and freshwater habitats are addressed within this chapter. Impacts and effects on watercourses are assessed in **Chapter 12:** Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**). The findings of this assessment are the basis for the impact

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			assessment presented in this chapter.
Natural England	January 2021 (Stage II Consultation / PEI Report)	Confirms that lichens and bryophytes are not a reason for the designation nor an integral part of a feature of Crowle Borrow Pits, Broughton Far Wood and Broughton Alder Wood SSSIs. Therefore, Natural England accepts that the higher nitrogen deposition threshold can be applied for these sites. Advises that the lower threshold should be applied for Risby Warren SSSI. Lichen heath (NVC code U1a) is a SSSI feature, although it is no longer present on the site due to air pollution impacts. Lichen heath is also a feature of Messingham Heath and Manton and Twigmoor SSSI. Natural England notes that several sites have been screened out from any further assessment because the process contributions (PC) have been	This clarification is acknowledged and has been considered in the operational air quality impact assessment (**Chapter 8:** Air Quality, ES Volume I - **Application Document Ref. 6.2**) and **Appendix 8B**: Air Quality Operational Phase (ES Volume II – **Application Document Ref 6.3**), which is the basis for the impact assessment presented in this chapter. The air quality impact assessment applies the critical levels given in the APIS database based on the advice of Natural England.

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		rounded down to a whole number, suggesting that the PC do not exceed the 1% thresholds. Natural England does not accept this approach. Our concern is that this could lead to situations where there are multiple process contributions. Natural England is of the opinion that further assessment should be provided to in relation to ammonia, nutrient nitrogen and acid deposition. Recent case law (Dutch Nitrogen ruling) makes it clear that small contributions should not be disregarded entirely. Where a site is in an unfavourable ecological state or condition or exceeds the environmental benchmarks, potential additional damaging effects will need careful justification. A key part of the assessment will be whether there is a real risk of the project compromising the ability to achieve favourable condition targets at the SSSI.	Rounding of PC is consistent with national good practice guidance. Natural England was consulted on this guidance and raised no issues. However, the basis of the point noted relates to potential cumulative effects, which Natural England acknowledges was not assessed in the PEI Report. The cumulative air quality modelling provided with the ES utilises unrounded data to derive a combined PC. The wider comments on the approach and requirements to air quality impact assessment are addressed in **Chapter 8:**

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			Air Quality (ES Volume I – **Application Document Ref. 6.2**). This defines the requirements for further assessment within this chapter. All sites requiring further ecological assessment are addressed in this chapter.
Environment Agency	January 2021 (Stage II Consultation / PEI Report)	Reference is made to works to achieve compliance with the Eels Regulations, which is welcomed. As this is the development of a new site the EA expect it will need to be screened/measures implemented to protect eel to best-practice and will be pleased to advise further regarding this when more details are provided/available.	The Proposed Development will provide appropriate eel and fish screening based on parameters advised by the Environment Agency (see **Chapter 4**: The Proposed Development (ES Volume I - **Application Document Ref. 6.2**)).
		Expects the ecology chapter included as part of the ES to provide justification for receptors scoped in or out of the review.	This is provided in this chapter and its supporting technical appendices, particularly **Appendix 11C**: Preliminary

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			Ecological Appraisal Report (ES Volume II - **Application Document Ref. 6.3**).
		Recommends details on temporary and permanent impacts to aquatic habitats be included in the ES. The ES should consider effects of thermal uplift and chemical alteration specifically against fish receptors. The MMO also expects the ES to include species-specific assessments for species of conservation importance.	This is provided in this chapter based on the baseline conditions defined in its supporting technical appendices. This ecological assessment is based on the concluded residual effects (i.e. after mitigation) to the water environment as detailed in **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**) and **Appendix 12B**: Water Framework Directive Assessment (ES Volume II - **Application Document Ref. 6.3**).

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
MMO	January 2021 (Stage II Consultation / PEI Report)	The information presented on ecological receptors, in particular fish ecology, is dispersed among several chapters and appendices which, at the same time, refer back to each other. This makes it difficult for the reader to locate the main subjects and potential issues associated with the Project. The ES would benefit from some signposting, specifically to those elements of the scheme that will be undertaken in the marine, intertidal or subtidal areas of the River Trent. The MMO do not agree that the area of mudflat habitat affected is negligible in the context of the size of the Humber Estuary and any ecological effect would be small-scale and short in duration; The MMO do not agree that the likelihood of the construction works resulting in a significant barrier to lamprey and other fish movements is low due to the large tidal river and that	Signposting of the relevant elements of the aquatic environment is provided in **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**). A summary of relevant fish species and their ecology is provided in **Appendix 11G**: Aquatic Ecology Survey Report (ES Volume II - **Application Document Ref. 6.3**). Impacts on the habitats of the Humber Estuary are considered in detail in the standalone HRA Screening Report (**Application Document Ref. 5.12**). In the event that the River Water Abstraction Option was

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		consideration of sensitive construction timings and methods would be given. The report lacks detail on exactly how the temporary and permanent impacts to aquatic habitats are likely to occur. The description of the environment for fish is very high-level. MMO would expect an extended description of the fish species inhabiting or using the River Trent during migrations/spawning to be included within the ES report which supports the applicant's conclusions on potential impacts to fish receptors, and to justify whether additional mitigation measures are required. Migratory fish species such as Atlantic salmon are considered to be vulnerable to noise and vibration disturbance from piling activity, therefore, these species should be considered in more detail in the ES and mitigation measures proposed. The ES should provide an estimate of the timing and duration of piling and	selected, no new permanent land take is required from the River Trent and its banks, instead the only construction works (if required) would relate to installation of an eel screen on the River Water Abstraction Option intake to meet legislative requirements. All relevant potential physical barriers (comprising a single cofferdam if the River Water Abstraction Option intake is adopted), and other impacts including those linked to potential impingement and entrainment, noise/ vibration and/ or thermal plume are assessed in this chapter based on the parameters for

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		construction activities that will take place within the River Trent in order to identify any potential overlap with the spawning and migratory periods of sensitive and protected fish species.	assessment established in **Chapter 9:** Noise and Vibration and **Chapter 12:** Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**).
North Lincolnshire Council (NLC)	January 2021 (Stage II Consultation / PEI Report)	The submitted PEA Report provides adequate evidence, in terms of site-based habitat suitability assessment and past survey results, to justify great crested newts being scoped out. NLC support the proposal to positively manage areas of acid grassland and open mosaic habitats. The applicant should provide the Planning Inspectorate with all the information reasonably required for an HRA. The information set out in the Biodiversity and Nature Conservation chapter of the PEIR seems broadly appropriate. NLC outline that their policy CS17: Biodiversity details the ways in which	An LBMEP (**Application Document Ref. 5.10**) accompanies the DCO Application. This presents biodiversity enhancement proposals and quantifies the proposed permanent habitat losses and gains. A standalone HRA Screening Report accompanies the Application (**Application Document Ref. 5.12**).

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		they promote effective stewardship of North Lincolnshire wildlife. Biodiversity enhancement should be secured by implementing the measures set out in Section 11.7 of the Biodiversity and Nature Conservation chapter of the PEIR. To make sure that biodiversity net gain is quantified and deliverable, the applicant is advised to make use of Biodiversity Metric Version 2.0. If it is not possible to deliver a net gain in biodiversity on-site, or on the applicant's land-holding, it may be possible to work with third-party landowners to deliver enhancements to nearby Local Wildlife Sites.	
Canal & River Trust	January 2021 (Stage II Consultation / PEI Report)	**Impact on Biodiversity** The increased period of disturbance on the canal corridor, and the introduction of an additional permanent structure for the intake could have a wider impact as it could increase the severance of the wildlife corridor. In line with the priorities of the 2020 Environment Bill	No new habitat severance will result if the canal is used as the preferred cooling water supply. The land that would be used has already been cleared and is in an area formerly containing hardstanding.

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		and the aims of paragraph 170 (part d), efforts should be taken to minimise impacts on and providing or net improvements to biodiversity. The Trust believe this would be most appropriately targeted on areas of the development where habitat loss would most likely occur and advise that habitat enhancement (as in over what is there at present) should be considered to mitigate for the proposed and to reinforce this part of the canal corridor. Approaches to enhance biodiversity in proximity to the abstraction installation could include new bank side vegetation using native hedgerow and tree species such as hawthorn and willow, and the use of emergent vegetation to help limit the potential for invasive weed growth in the canal during the summer months.	Proposals for landscape and biodiversity mitigation and enhancement are provided as a standalone LBMEP to accompany the DCO Application (**Application Document Ref. 5.10**).
Internal Drainage Board (IDB)	January 2021 (Stage II	IDB are keen to progress the proposals to improve water vole habitat and to	These proposals are described in the

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
	Consultation / PEI Report)	potentially extend habitat improvements to other areas.	standalone LBMEP that accompanies the DCO Application (**Application Document Ref. 5.10)**.
Lincolnshire Wildlife Trust (LWT)	January 2021 (Stage II Consultation / PEI Report)	Presently, LWT have yet to be presented with sound evidence that CCS at sea will not have a negative impact on the marine environment. If inappropriately located, this infrastructure could lead to direct impacts or have long-term negative impacts on marine protected areas and the ability to secure sustainable Living Seas. The information relating to biodiversity does not meet current and emerging best practice within the sector. Whilst LWT recognise that NSIPs are currently exempt from having to provide Biodiversity Net Gain within the scope of the Environment Bill currently traversing Parliament, LWT strongly believe that they should also employ the Biodiversity Metric and aim to	The Northern Endurance Partnership (NEP) will be responsible for the offshore section of the carbon dioxide (CO_2) transport/ export pipeline to the Endurance geological store under the North Sea, CO_2 injection wells and associated works. These elements do not form part of the DCO Application and will be subject to separate offshore consent applications by third parties. Impacts on the marine environment would be assessed in any such consent applications by third parties. The need for CCS schemes such as

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		secure an absolute minimum of 10% BNG. Currently, there is very little information included on how the project will deliver biodiversity enhancement, and subjective value judgements have been made regarding habitats present. LWT would strongly recommend that the information from the site surveys is used to complete the Defra Biodiversity Metric. LWT also note that this information was requested by the EA in their scoping response.	the Proposed Development aligns with current Government policy in the Energy White Paper and the NPS and is set out in the Applicant's Planning Statement (**Application Document Ref. 5.5)** The PEI Report identified that enhancement proposals would be provided in more detail in the ES after consulting with relevant stakeholders. These proposals are provided in the LBMEP that accompanies the DCO Application (**Application Document Ref. 5.10**). This includes quantification of

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			permanent habitat losses and gains. Currently, there is no legal or planning policy requirement to achieve a specific percentage net gain for NSIP. Requirements in this regard have been discussed with North Lincolnshire Council.
Forestry Commission	January 2021 (Stage II Consultation / PEI Report)	In relation to any tree planting or woodland creation as part of mitigation or biodiversity enhancement for the proposed development the Forestry Commission recommend that this is carried out in accordance with the UK Forestry Standard.	No tree or woodland planting is proposed because no trees would be removed for the Proposed Development. Instead biodiversity enhancement proposals are made with reference to the site context and the existing high biodiversity value of adjacent land within the former Keadby Ash Tip.

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
Lincolnshire Wildlife Trust	Additional S42 consultation April 2021	Generally pleased that amendments to order limits (particularly in Areas A & B) will result in additional areas available for biodiversity enhancements and reduced impacts on North Engine Drain/ Hatfield Waste Drain LWS sites. Pleased that the ES will contain application of Defra Biodiversity Metric which it notes NSIP are currently exempt from mandatory requirement to provide Biodiversity Net Gain within the scope of the Environment Bill). LWT consider that the project should be aiming for a significant net gain of biodiversity, securing a minimum of 10% measurable BNG.	Noted. To support the overall objective of no net loss and net gain, use has been made of the Natural England biodiversity metric (Natural England, 2019). Results are available presented in the LBMEP (**Application Document Ref. 5.10**; annex D), which also includes the assumptions that have informed this assessment. The summary findings confirm: • a gain in habitat units is achievable; • a gain in hedgerow units is achievable; and • the broad requirements of planning policy to

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
			achieve no net loss and a net gain are met.
Marine Management Organisation	May 2021 (Technical Engagement)	Given the low hearing sensitivity and nocturnal migratory habit of lamprey, the MMO consider the conclusion that adverse effects on lamprey are likely to be negligible as piling will not be undertaken at night to be appropriate […]To protect the upstream migration of adult salmon, the Applicant is proposing to restrict all piling activity (vibro-piling and percussive piling) between September to November […] the MMO support this mitigation measure. The MMO are of the opinion that no night-time piling will provide adequate mitigation for salmon smolts […]The MMO welcome the proposed mitigation which will enable unhindered movement of adult salmon past the Keady 3 site during their migration to spawning grounds. Other fish species may also be present in the River Trent such as the European	Following the technical engagement meeting with the MMO and their technical advisers at the Centre for Fisheries, Environment and Aquaculture Science (Cefas), the commitment to a seasonal restriction for all forms of piling within the River Trent has been confirmed. Specifically, piling within the River Trent will not be undertaken during the key upstream adult migration period for salmon (September to November). Further details are provided within Section 11.5 of **Chapter 11**: Biodiversity (ES Volume I – **Application**

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		eel (which haven't been considered). MMO believe juvenile glass eels migrate upstream to freshwaters in spring; glass eels usually start arriving around February, reaching a peak in April. Migration takes place almost exclusively in twilight or darkness, using the upstream current from incoming tides to assist. No piling at night will therefore likely minimise the risk of impact on migrating juvenile eels. The MMO recommend details of the local hydrodynamics (e.g. tidal range/currents and river flow) be included with the sediment details of the Coastal Processes section of the notes. The MMO support the Applicant's proposed to undertake soft-start procedures on commencement of impact piling in accordance with JNCC (2010) guidelines and note that this will need to be secured by a condition on the Deemed Marine Licence. To ensure that the seasonal restrictions both	**Document Ref. 6.2**). Following the MMO's review of the draft DML, this has also been included as a draft condition on the DML which is provided as part of the draft DCO (**Application Document Ref. 2.1**). The additional recommendation for daytime piling within the River Trent is noted; all piling works within the Trent would be limited to core daytime hours to minimise potential impacts on migrating fish. The potential ecological impacts arising from the presence of a cofferdam are considered within this

Consultee or organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		actionable and enforceable the MMO recommend the following wording for the licence conditions: [I of II] No piling activity must be conducted between 01 September to 31 November […and II of II] vibratory piling must only take place during between sunrise and sunset each day (daylight hours) […].	chapter. Further details, including those related to tidal range, currents and flows, are considered within **Chapter 12**: Water Environment (ES Volume I – **Application Document Ref. 6.3**). In order to validate these predictions, pre and post-works bathymetry conditions are included within the draft DML, which has been subject to MMO review; this is included within the draft DCO (**Application Document Ref. 2.1**).

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

11.3.2 The PEI Report was published for statutory consultation in November 2020, allowing consultees the opportunity to provide informed comment on the Proposed Development, the assessment approach and preliminary findings through a consultation process, prior to finalising the ES. A PEI Report Addendum was subsequently published in March 2021 following minor changes that were made to the indicative Order Limits since the formal Stage 2 consultation.

11.3.3 The key changes relevant to this chapter since the PEI Report and PEI Report Addendum were published are summarised in Table 11.3 below.

Table 11.3: Summary of key changes to chapter since publication of the PEI Report and addendum

Summary of change since PEI Report and addendum	Reason for change	Summary of change to chapter text in the ES
Higher critical levels for the assessment of ammonia impacts and effects have been applied to Broughton Far Wood and Broughton Alder receptors.	Through consultation with Natural England, it has been identified that these sites are not as sensitive to atmospheric ammonia concentrations as was conservatively assessed at PEI Report stage.	Section 11.6 has been updated to reflect this change.
Minor amendment to the habitat impact assessment to include additional construction impacts on Open Mosaic Habitats and Scrub.	Review of indicative layouts identified a minor overlap with the former Keadby Ash Tip where habitats were stated to be retained.	Section 11.6 has been updated to reflect this change.
Provision of supplementary information on fish to support the impact assessment.	Further information was requested by the MMO and was also needed to inform assessment of potential impacts from underwater sound during piling.	**Appendix 11G** (ES Volume II – **Application Document Ref 6.3**) has been updated. A new appendix is provided – **Appendix 11H** (ES Volume II – **Application**

Summary of change since PEI Report and addendum	Reason for change	Summary of change to chapter text in the ES
		Document Ref 6.3). Section 11.6 has been updated with reference to the above.
Information provided on the biodiversity enhancements proposed as part of the Proposed Development.	Biodiversity enhancement proposals have been identified and an LBMEP (**Application Document Ref.5.10**) has been prepared.	The proposed biodiversity enhancements are outlined in Section 11.7 and further detail is provided within the LBMEP (**Application Document Ref.5.10**).

Assessment Methods

11.3.4 The EcIA detailed in this chapter has been undertaken in accordance with best practice guidance issued by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2019). Full details of the approach applied are provided in **Appendix 11B:** Ecological Impact Assessment Methods (ES Volume II - **Application Document Ref. 6.3**), with an abridged overview provided below. The aims of the EcIA are to:

- identify relevant biodiversity and nature conservation features (i.e. designated sites, habitats, species or ecosystems) which may be impacted as a consequence of the Proposed Development. EcIA can also encompass geological features but this is not within the scope of this chapter (instead refer to **Chapter 13**: Geology, Hydrogeology and Land Contamination (ES Volume I - **Application Document Ref. 6.2**));
- provide a scientifically rigorous and transparent assessment of the likely ecological impacts and resultant effects of the Proposed Development. Impacts and effects may be beneficial (i.e. positive) or adverse (i.e. negative);
- facilitate scientifically rigorous and transparent determination of the consequences of the Proposed Development in terms of national and local policies relevant to nature conservation and ecological, where the level of detail provided is proportionate to the scale of the development and the complexity of its potential impacts; and

- set out what steps would be taken to adhere to legal requirements relating to the relevant biodiversity and nature conservation features concerned.

11.3.5 The principal steps involved in the CIEEM approach can be summarised as:

- biodiversity and nature conservation that are both present and might be affected by the Proposed Development are identified (both those likely to be present at the time works begin, and for the sake of comparison, those predicted to be present at a set time in the future) through a combination of targeted desk-based study and field survey work to determine the relevant baseline conditions (this is provided in **Appendices 11C** to **11G** (ES Volume II - **Application Document Ref. 6.3**);
- the importance of the identified biodiversity and nature conservation features is evaluated to place their relative nature conservation value into geographic context, and this is used to define the relevant features that need to be considered further within the impact assessment process (this is provided in **Appendices 11C** to **11G** (ES Volume II - **Application Document Ref. 6.3**);
- the changes or perturbations predicted to result as a consequence of the Proposed Development (i.e. the potential impacts), and which could potentially affect relevant biodiversity and nature conservation features are identified and their nature described. Established best-practice, legislative requirements or other incorporated design measures to minimise or avoid impacts are also described and are considered;
- the likely effects (beneficial or adverse) on relevant biodiversity and nature conservation features are then assessed, and where possible quantified;
- measures to avoid or reduce any predicted significant effects, if possible, are then developed in conjunction with other elements of the design (including mitigation for other environmental disciplines). If necessary, measures to compensate for effects on biodiversity and nature conservation features are also included;
- any residual effects of the Proposed Development are reported; and
- scope for ecological enhancement is considered.

11.3.6 It is not necessary in the assessment to address all habitats and species with potential to occur, and instead the focus should be on those that are 'relevant'. CIEEM (2019) makes clear that is no need to *"carry out detailed assessment of ecological features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable*". This does not mean that efforts should not be made to safeguard wider biodiversity, and requirements for this have been considered. National policy documents emphasise the need to achieve no net loss of biodiversity and enhancement of biodiversity.

11.3.7 To support focussed EcIA there is a need to determine the scale at which the relevant biodiversity and nature conservation features identified through the desk studies and field surveys undertaken for the Proposed Development are of value (this is provided in **Appendices 11C to 11G** (ES Volume II - **Application Document Ref. 6.3**)). The value of each relevant ecological feature has been defined with reference to the geographical level at which it matters. The frames of reference used for this assessment, and based on CIEEM guidance, are:

- International (generally this is within a European context, reflecting the general availability of good data to allow cross-comparison);
- National (Great Britain, but considering the potential for certain features to be more notable (of higher value) in an England context relative to Great Britain as a whole);
- Regional (East Midlands);
- County (Lincolnshire);
- District (North Lincolnshire);
- Local (features that do not meet criteria for valuation at a District or higher level, but that have sufficient value at the site level to merit retention or mitigation); and
- Negligible (common and widespread features that have very low value at the site level and which do not require retention or mitigation at the relevant location to otherwise maintain a favourable nature conservation status, or to deliver wider relevant biodiversity objectives).

11.3.8 In line with the CIEEM guidelines the terminology used within the EcIA draws a clear distinction between the terms 'impact' and 'effect'. For the purposes of the EcIA these terms are defined as follows:

- impact – actions resulting in changes to an ecological feature. For example, demolition activities leading to the removal of a building utilised as a bat roost; and
- effect – outcome resulting from an impact acting upon the conservation status or structure and function of an ecological feature. For example, killing/ injury of bats and reducing the availability of breeding habitat as a result of the loss of a bat roost may lead to an adverse effect on the conservation status of the population concerned.

11.3.9 When describing potential impacts (and where relevant the resultant effects) consideration is given to the following characteristics likely to influence this:

- beneficial/ adverse - i.e. is the change likely to be in accordance with nature conservation objectives and policy;

- beneficial (i.e. positive) - a change that improves the quality of the environment, or halts or slows an existing decline in quality e.g. increasing the extent of a habitat of conservation value;
- adverse (i.e. negative) - a change that reduces the quality of the environment. e.g. destruction of habitat or increased noise disturbance;
- magnitude - the 'size', 'amount' or 'intensity' of an impact - this is described on a quantitative basis where possible;
- spatial extent - the spatial or geographical area or distance over which the impact/ effect occurs;
- duration - the time over which an impact is expected to last prior to recovery or replacement of the resource or feature. Consideration has been given to how this duration relates to relevant ecological characteristics such as a species' lifecycle. However, it is not always appropriate to report the duration of impacts in these terms. The duration of an effect may be longer than the duration of an activity or impact;
- reversibility - i.e. is the impact temporary or permanent. A temporary impact is one from which recovery is possible or for which effective mitigation is both possible and enforceable. A permanent effect is one from which recovery is either not possible, or cannot be achieved within a reasonable timescale (in the context of the feature being assessed); and
- timing and frequency - i.e. consideration of the point at which the impact occurs in relation to critical life-stages or seasons.

Extent of Study Area

11.3.10 The study areas used to gather baseline data for this assessment are consistent with those reported in **Appendix 11C**: PEA (ES Volume II - **Application Document Ref. 6.3**). These study areas were specified to support collation of sufficient data to meet worst-case data needs for robust ecological impact assessment in accordance with Rochdale Envelope principles. These study areas were therefore generally precautionary.

11.3.11 The baseline data gathered has been reviewed to identify relevant ecological features that could interact with the Proposed Development in a manner sufficient to result in an adverse effect (i.e. ecological features within the 'zone of influence'). This chapter therefore does not address any identified ecological features for which there is no likelihood of an adverse effect as these are scoped out (refer to **Appendix 11C**: PEA (ES Volume II - **Application Document Ref. 6.3**).

11.3.12 The relevance of each ecological feature identified has been considered case by case. Professional judgement has been used, based on understanding of the ecology and relative sensitivities of the features concerned and the relevant requirements of the Proposed Development that are likely to interact

with them. It has also considered the requirements of regulatory stakeholders and other good practice guidance, the relative nature conservation importance of the features concerned, and any implications arising from relevant legal protections.

11.3.13 The potential distances over which the Proposed Development may interact with different ecological features can vary over time. For example, the construction zone of influence may be more or less that of the operational zone of influence. Typically, the zone of influence is greatest during construction but there can be significant exceptions to this, particularly when considering potential air quality impacts and effects. For example, regulatory stakeholders require assessment of potential operational air quality impacts and effects on all European Sites and other national nature conservation designations within 15km, but only require assessment of local non-statutory designations within 2km. These are therefore the good practice study areas adopted within this chapter for nature conservation designations.

11.3.14 The extent of the study areas applied during the desk study and field surveys are detailed within Table 11.5 and Table 11.6.

Significance Criteria

11.3.15 For each relevant biodiversity and nature conservation feature, only those characteristics relevant to understanding the effect and determining the significance are described. The determination of the significance of effects has been made based on the predicted effect on the structure and function, or conservation status, of relevant biodiversity and nature conservation features, as follows:

- not significant - no effect on structure and function, or conservation status; and
- significant - structure and function, or conservation status is affected.

11.3.16 For significant effects (both adverse and beneficial) this is qualified with reference to the geographic scale at which the effect is significant (e.g. an adverse effect significant at a national level).

11.3.17 The CIEEM approach described in **Appendix 11B:** Ecological Impact Assessment Methods (ES Volume II - **Application Document Ref. 6.3**) broadly accords with the EIA methodology described in **Chapter 2**: Assessment Methodology (ES Volume I - **Application Document Ref. 6.2**). However, the matrix has not been used to classify effects as this would deviate from CIEEM guidance. In order to provide consistency of terminology in the final assessment, the findings of the CIEEM assessment have been translated into the classification of effects scale used in other chapters of the ES as outlined in Table 11.4.

Table 11.4: Relating CIEEM assessment terms to those used in other ES chapters

Effect classification terminology used in other ES chapters		Equivalent CIEEM assessment
Significant (beneficial)	Major beneficial	Beneficial effect on structure/ function or conservation status at regional, national or international level.
	Moderate beneficial	Beneficial effect on structure/ function or conservation status at County level.
Non-significant	Minor beneficial	Beneficial effect on structure/ function or conservation status at Site or Local level.
Non-significant	Negligible	No effect on structure/ function or conservation status.
Non-significant	Minor adverse	Adverse effect on structure/ function or conservation status at Site or Local level.
Significant (adverse)	Moderate adverse	Adverse effect on structure/ function or conservation status at County level.
	Major adverse	Adverse effect on structure/ function or conservation status at regional, national or international level.

Data Sources

11.3.18 The biodiversity and nature conservation baseline has been determined through a combination of desk study and field survey, as described in **Appendices 11B** to **11G** (ES Volume II - **Application Document Ref. 6.3**) and summarised below.

Desk Study

11.3.19 A desk study was carried out to identify nature conservation designations, protected and notable habitats and species potentially relevant to the Proposed Development. The desk study was carried out using the data sources detailed in Table 11.5 and is reported in detail in the Preliminary Ecological Appraisal (PEA) report provided as **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**).

11.3.20 The desk study was also carried out using the data sources detailed in Table 11.5. Protected and notable habitats and species are taken to include those listed under Schedules 1, 5 and 8 of the WCA; Schedules 2 and 5 of the Habitats Regulations; species and habitats of principal importance for nature conservation in England listed under section 41 (s41) of the NERC Act; and other species that are Nationally Rare, Nationally Scarce or listed in national or local Red Data Lists and Biodiversity Action Plans.

11.3.21 Records of plant Invasive Non-native Species (INNS), as listed under Schedule 9 of the WCA and Schedule 2 of the Invasive Alien Species (Enforcement and Permitting) Order 2019, and other relevant INNS were also collated and have been considered when assessing the potential ecological effects of the Proposed Development. It would not be appropriate to attribute the same weight to these non-native species as has been applied to relevant biodiversity and nature conservation features when determining the likely significant effects of the Proposed Development, as the presence of such species is generally detrimental for ecology, and conversely the removal of such species would usually be considered desirable and beneficial for ecology.

11.3.22 The need to control the movement and establishment of INNS is driven by the requirements of relevant legislation, as well as the wider implications of the species concerned e.g. their potential to damage or impeded operation of the Proposed Development. Therefore, while the invasive species concerned are not relevant features for the purposes of EcIA, there is still a need to consider them in terms of their potential:

- relevance to the delivery of compliance with biodiversity and nature conservation legislation (including potential implications from a necessary use of chemical anti-fouling treatments to treat the water supply);
- to contribute to the amplification of any adverse effects arising from the Proposed Development; or
- to conflict with objectives for ecological mitigation, compensation and enhancement.

Table 11.5: Desk study area and data sources

Type of ecological feature	Desk study area	Data sources
European Sites e.g. SAC, Special Protection Area (SPA), Ramsar site	15km	Multi-Agency Geographic Information for the Countryside (MAGIC) website (www.magic.gov.uk) (accessed February 2020)
National statutory nature conservation	15km	MAGIC website (accessed February 2020)

Type of ecological feature	Desk study area	Data sources
designations e.g. Site of Special Scientific Interest (SSSI)		
Local statutory and non-statutory nature conservation designations (biodiversity) e.g. Local Nature Reserve (LNR), Local Wildlife Site (LWS), Site of Importance for Nature Conservation (SINC), ancient woodland	2km	Lincolnshire Environmental Records Centre (LERC) (data received February 2020)
Protected and notable habitats and species[1]	1km	LERC (data received February 2020) Previous ecological survey information for the former Keadby Ash Tip collected by AECOM in 2017. This information covers: • habitats; • protected and notable flora; and • protected and notable fauna: great crested newt, reptiles, badger, bats, water vole, otter, breeding birds, terrestrial invertebrates and aquatic invertebrates. Previous ecological survey information covering the Proposed Development Site and adjacent land contained within reports to the Applicant for Keadby 2 Power Station and Keadby Wind Farm.

[1] Protected and notable habitats and species include those listed under Schedules 1, 5 and 8 of the WCA; Schedules 2, 4 and 5 of The Habitats Regulations; and species and habitats of Principal Importance for nature conservation in England listed under Section 41 of the NERC Act. Records of non-native controlled weed species were also collated; such species are listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

Type of ecological feature	Desk study area	Data sources
		The Environment Agency Ecology and Fish Explorer Database (accessed May 2020).
Ancient and veteran trees	1km	LERC (data received February 2020) Ancient tree inventory website (https://ati.woodlandtrust.org.uk/tree-search) (accessed July 2020)

Field Surveys

11.3.23 The scope of works for necessary habitat and protected species surveys was determined and confirmed through Phase 1 Habitat survey and PEA as described in **Appendix 11C**: Preliminary Ecological Appraisal Report (ES Volume II - **Application Document Ref. 6.3**).

11.3.24 The scope of the field surveys completed to inform the EcIA, described in **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**), is summarised in Table 11.6 below. Full details of the scope and methods for each survey are provided in the technical **Appendices 11C** to **11G** (ES Volume II - **Application Document Ref. 6.3**), as cross referenced in Table 11.6.

Table 11.6: Ecological field surveys defining the baseline for the Proposed Development

Ecological survey	Appendix (ES Volume II)	Scope of survey	Survey date
Habitat	11C (main report)	Phase 1 Habitat survey of land within the Proposed Development Site and immediately adjacent.	Completed 15th July 2020
Botanical (terrestrial)	11C (Annex 11E)	National Vegetation Classification (NVC) and detailed botanical appraisal of notable acid grasslands and Open Mosaic Habitats (OMH) with the former Keadby Ash Tip	Completed 17th July 2017, re-verified by original specialist surveyor 15th July 2020

Ecological survey	Appendix (ES Volume II)	Scope of survey	Survey date
Botanical (aquatic)	11C (Annex 11E) 11G	Aquatic macrophyte surveys of relevant watercourses.	Completed 17th July 2017 (Keadby Ash Tip) and 15th July 2020 (other watercourses)
Aquatic invertebrates	11C (Annex 11E) 11G	Aquatic macroinvertebrate surveys of relevant watercourses.	Completed 17th July 2017 (Keadby Ash Tip), 19th May 2020 (Keadby Common drains) and 14th July 2020 (Stainforth and Keadby Canal)
Badger	11D (confidential)	Suitable habitat for badger within 50 m of the Proposed Development Site.	Completed 22nd April 2020 with supplementary inspection 15th July 2020
Bats – roost appraisal	11C	Inspection of all suitable trees (no relevant buildings or structures) within the Proposed Development Site.	Completed 22nd April 2020
Bats – activity surveys	11E	Walked transects in spring, summer and autumn to record and map bat activity in association with Keadby Common and Ash Tip. Coinciding periods of remote static detector deployment (five nights minimum per period).	Completed 5th October 2020
Breeding birds	11C (Annex 11H)	Five walked transects to record evidence of breeding within the former Keadby Ash Tip.	Completed 9th June 2017

Ecological survey	Appendix (ES Volume II)	Scope of survey	Survey date
Reptiles	11C (Annex 11F)	Artificial refuge survey with a minimum of seven visits for presence/ absence undertaken. Suitable habitats in the former Keadby Ash Tip.	Completed 3rd July 2017, habitat suitability re-verified 22nd April 2020
Riparian mammals (water vole and otter)	11F	Early (spring) and late (summer) season surveys of relevant watercourses within and adjacent to the Proposed Development Site boundary.	Completed 12th August 2020, with a top-up survey to address red line changes completed 20th October 2020
Terrestrial invertebrates	11C (Annex 11G)	Scoping visit by specialist to undertake habitat appraisal to identify key areas for targeted survey. Follow-up survey visit as advised based on habitat appraisal.	Completed 25th July 2017, re-verified by original specialist surveyor 15th July 2020

Use of the Rochdale Envelope

11.3.25 For the purposes of the ecological impact assessment (EcIA) it is assumed that the majority of the Proposed PCC Site and associated laydown areas shown in **Figure 5.1** (ES Volume III – **Application Document Ref. 6.4**) would be cleared, no matter what the final sizing and layout of the structures is. The Rochdale Envelope parameters (i.e. the maximum parameters for the Proposed Development and its main structures) presented in **Chapter 4**: The Proposed Development and **Chapter 5**: Construction Programme and Management (ES Volume I, **Application Document Ref. 6.2**) therefore do not alter the parameters of the assessment of construction (or decommissioning) impacts on ecology, as they are worst-case.

11.3.26 For the purposes of worst-case assessment two potential cooling water supply options are identified and assessed, one option involves abstraction of cooling water from the Stainforth and Keadby Canal, and the other involves abstraction from the River Trent. The latter is the worst-case option for this assessment given the number of nature conservation designations applied

to the River Trent and its associated biodiversity and nature conservation importance. Only one of these options will be selected at detailed design and the preferred water supply is the Stainforth and Keadby Canal, subject to water availability from the canal.

11.3.27 For the assessment of air quality impacts during operation (and thereby the effects reported on the ecological features in this chapter), several worst-case assumptions have been included in the assessment to ensure that it is conservative. These relate to emission parameters, running hours, and selection of stack heights and stack locations (refer to Section 8.3 'Rochdale Envelope' of **Chapter 8**: Air Quality (ES Volume I - **Application Document Ref. 6.2**)). The assessment of operational impacts presented in this chapter is therefore also based upon a worst-case.

11.3.28 **Chapter 9**: Noise and Vibration (ES Volume I - **Application Document Ref. 6.2**) assesses a worst-case i.e. the maximum parameters for the Proposed Development and in particular its main buildings and structures) during operation and also includes a construction noise and vibration assessment based on the worst-case assumption of activities occurring at the closest part of the Proposed Development Site to each relevant ecological feature. Where relevant, the assessment of potential noise and vibration disturbance impacts presented in this chapter is therefore also based on a worst-case.

11.4 Baseline Conditions

Existing Baseline

11.4.1 The biodiversity and nature conservation features relevant to the Proposed Development are summarised in this section. Details of the findings of desk and field-based studies, including evaluation of the relative nature conservation value of identified features is provided in **Appendices 11C** to **11F** (ES Volume II - **Application Document Ref. 6.3**). These appendices should be referred to where more information is required on the grounds for scoping features in and out of the impact assessment.

European Sites and National Statutory Nature Conservation Designations

11.4.2 There are six European Sites and 23 other national statutory nature conservation biodiversity and nature conservation designations within the study area relevant to the EcIA of the Proposed Development (as defined in **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**)). Most of these designations are located at distance from the Proposed Development Site but have been scoped in at this stage to meet good practice requirements for the assessment of potential operational air quality impacts and effects, as set out in **Chapter 8**: Air Quality (ES Volume I - **Application Document Ref. 6.2**).

11.4.3 The relevance of the identified European Sites and other national nature conservation designations to the Proposed Development is summarised below in Table 11.7 (in order of distance from the Proposed Development Site) based on the initial screening and rationale provided in **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**).

Table 11.7: Relevant international and national conservation designations

Designation	Potential impacts during			Relevance to the Proposed Development
	Construction	Operation	Decommissioning	
Humber Estuary Ramsar site	✓	✓	✓	Applies to the River Trent which is the location of the Potential River Water Abstraction Option, Water Discharge Corridor and the Waterborne Transport Off-loading Area. 1.3km east of the Main Site (i.e. the source of operational emissions to air).
Humber Estuary SAC	✓	✓	✓	As above
Humber Estuary SSSI	✓	✓	✓	As above
Crowle Borrow Pits SSSI	x	✓	x	2.8km south-west of Main Site
Hatfield Chase	x	✓	x	3.0km south-west of Main Site

Designation	Potential impacts during			Relevance to the Proposed Development
	Construction	Operation	Decommissioning	
Ditches SSSI				
Eastoft Meadow SSSI	x	✓	x	3.7km north-west of Main Site
Thorne and Hatfield Moors SPA	x	✓	x	6.3km north-west of Main Site
Thorne Moor SAC	x	✓	x	6.3km north-west of Main Site
Thorne, Crowle and Goole Moors SSSI	x	✓	x	6.3km north-west of Main Site
Humberhead Peatlands NNR	x	✓	x	6.3km north-west of Main Site
Belshaw SSSI	x	✓	x	7.7km south-west of Main Site
Risby Warren SSSI	x	✓	x	9.0km north-east of Main Site
Humber Estuary SPA	x	✓	x	9.8km north-east of Main Site
Epworth Turbary SSSI	x	✓	x	9.8km south-west of Main Site
Messingham Heath SSSI	x	✓	x	9.9km south-east of Main Site
Hatfield Moors SSSI	x	✓	x	10.4km south-west of Main Site
Hatfield Moor SAC	x	✓	x	10.4km south-west of Main Site

Designation	Potential impacts during			Relevance to the Proposed Development
	Construction	Operation	Decommissioning	
Tuetoes Hills SSSI	x	✓	x	10.4km south-east of Main Site
Haxey Turbary SSSI	x	✓	x	11.9km south-west of Main Site
Rush Furlong SSSI	x	✓	x	12.0km south of Main Site
Messingham Sand Quarry SSSI	x	✓	x	12.0km south-east of Main Site
Manton and Twigmoor SSSI	x	✓	x	12.2km south-east of Main Site
Scotton and Laughton Forest Ponds SSSI	x	✓	x	12.4km south-east of Main Site
Hewson's Field SSSI	x	✓	x	12.7km south-east of Main Site
Broughton Far Wood SSSI	x	✓	x	13.6km east of Main Site
Broughton Alder Wood SSSI	x	✓	x	13.9km east of Main Site
Scotton Beck Fields SSSI	x	✓	x	13.9km south-east of Main Site
Scotton Common SSSI	x	✓	x	14.1km south-east of Main Site
Laughton Common SSSI	x	✓	x	14.7km south of Main Site

Local Nature Conservation Designations, Including Nature Improvement Areas and Ancient Woodland

11.4.4 There are 11 local non-statutory nature conservation designations within the study area relevant to the EcIA of the Proposed Development (as defined in **Appendix 11C** (ES Volume I - **Application Document Ref. 6.3**)). These designations are all of county nature conservation value.

11.4.5 In addition, the Proposed Development is located within a landscape identified as the Humberhead Levels Nature Improvement Area (NIA). It is one of 12 NIA chosen by the Government to create joined up and resilient ecological networks at a landscape scale. However, the Proposed Development does not directly affect any land under active management for the NIA.

11.4.6 There are no statutory LNR or ancient woodlands in the study area.

11.4.7 The relevance of the identified non-statutory nature conservation designations to the Proposed Development is summarised below identified in Table 11.8 (in order of distance from the Proposed Development Site) based on the initial screening and rationale provided in **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**).

Table 11.8: Relevant local nature conservation designations

Designation	Potential impacts during			Relevance to the Proposed Development
	Construction	Operation	Decommissioning	
Keadby Warping Drain LWS	x	✓	x	0.3km north of Main Site. Crossed by the buried pipeline for the existing line of discharge from Keadby 1 Power Station, but no construction works proposed.
Stainforth and Keadby Canal Corridor LWS	✓	✓	✓	If used, the Potential Canal Water Abstraction Option would take water from the LWS - also crossed

Designation	Potential impacts during			Relevance to the Proposed Development
	Construction	Operation	Decommissioning	
				by the access route over North Pilfrey Bridge. 0.3km south-east of Main Site.
Hatfield Waste Drain LWS	✓	x	✓	Crossed by the proposed Mabey Bridge replacement, north of the A18 Junction Improvement at the Proposed Development Site entrance.
Keadby Boundary Drain LWS	✓	✓	✓	Located adjacent to (and west of) and downstream of Main Site.
North Engine Drain, Belton LWS	✓	x	✓	10m south of the proposed A18 carriageway improvement at the Proposed Development Site entrance.
River Torne LWS	✓	x	✓	25m south of the proposed A18 carriageway improvement at Proposed Development Site entrance.
South Soak Drain, Keadby LWS	✓	✓	✓	25m south-east of the Potential Canal Water

Designation	Potential impacts during			Relevance to the Proposed Development
	Construction	Operation	Decommissioning	
				Abstraction Option on the Stainforth and Keadby Canal. 0.6km south-east of Main Site.
Keadby Wetland LWS	✓	✓	✓	25m south-east of the Potential Canal Water Abstraction Option on the Stainforth and Keadby Canal. 0.7km south-east of Main Site.
Keadby Wet Grassland LWS	✓	✓	✓	50m south-east of the Potential Canal Water Abstraction Option on the Stainforth and Keadby Canal. 0.7km south-east of Main Site.
Three Rivers LWS	x	✓	x	0.1km south (upstream) of the Waterborne Transport Off-loading Area on the River Trent. 1km south of Main Site.
South Engine Drain LWS	✓	x	✓	0.1km south of the proposed A18 carriageway improvement works at the

Designation	Potential impacts during			Relevance to the Proposed Development
	Construction	Operation	Decommissioning	
				Proposed Development Site entrance.

Protected and Notable Habitats

11.4.8 Protected and notable habitats located within the boundaries of nature conservation designations are assessed in relation to those designations and are not duplicated within this section.

11.4.9 The semi-natural habitats within the Proposed Development Site are summarised below in Table 11.9 and mapped on Figures 11C.3 and 11C.4 (**Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**)), along with identification of whether or not the land they occupy would be required for the construction, operation and/ or decommissioning of the Proposed Development. These habitats are further described, and their nature conservation value further qualified, in **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**). Further detail on relevant aquatic habitats is also presented within **Appendix 11G** (ES Volume II - **Application Document Ref. 6.3**).

11.4.10 All habitats of local or higher value within the Proposed Development Site, as identified in Table 11.9, are taken forward for impact assessment where there is potential for these to be adversely affected. Retained habitats, including those within the Keadby 1 Power Station and Keadby 2 Power Station complex and along the alignment of the proposed Water Connection Corridors, are not assessed further as they would not be affected by, and are therefore not relevant to the assessment of, construction, operation and decommissioning of the Proposed Development.

11.4.11 Other habitats within the 1km study area for this EcIA (as defined in Table 11.5) are only assessed further where they are of sufficiently high biodiversity and nature conservation value (as defined in **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**)) and therefore where assessment of potential indirect impacts and effects is appropriate, after first considering typical good practice requirements for air and water quality impact assessment as defined in **Chapter 8**: Air Quality and **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**) respectively. Accordingly, the OMH and acid grassland habitat of national nature conservation value within the former Keadby Ash Tip (see **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**)) adjacent to the Proposed Development Site is taken forward for impact assessment.

Table 11.9: Summary of the undesignated semi-natural habitats present within and adjacent to the Proposed Development Site

Habitat	Value	Area (ha)/ Length (km)	Relevant to the EcIA
Within the Proposed Development Site			
Amenity grassland	Negligible	1.1ha	No - screened out based on value and location (no impact)
Arable farmland	Negligible	17.3ha	No - screened out based on value
Ephemeral/ short perennial vegetation, including OMH	Negligible or National (if OMH)	3.2ha	Yes – overlaps with the land required for construction and temporary laydown
Hedgerows and free-standing trees	Local (hedgerows) Negligible (free standing trees)	1.4km	No - screened out based on location (no impact)
Improved grassland	Negligible	10.9ha	No – screened out based on value
Neutral semi-improved grassland	Negligible	12.5ha	No - screened out based on value
Plantation broad-leaved woodland	Local	0.8ha	No - screened out based on location (no impact)
Scrub (dense and scattered)	Local	0.8ha	Yes - within land required for construction and temporary laydown
Watercourse: drains and canal	Up to county	2.0km	Yes - within land required for construction of the Main Site and the Emergency Vehicle Access Road

Habitat	Value	Area (ha)/ Length (km)	Relevant to the EcIA
Adjacent to the Proposed Development Site (relevant habitats only, see main text)			
Acid grassland	National	7.9ha	Yes – relevant to operational air quality assessment
OMH	National	15.4ha	Yes – relevant to operational air quality assessment

Protected and Notable Species

11.4.12 Protected and notable species potentially relevant to this EcIA are summarised below in Table 11.10, with further information provided in **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**). The identification of relevant species is further described, and their nature conservation value further qualified, in **Appendices 11C** to **11G** (ES Volume II - **Application Document Ref. 6.3**). Generally, only confirmed species of local or higher value (as identified in Table 11.10) are taken forward for impact assessment, although some consideration is also given to species that may establish in the future, as well as INNS of plants and animals. Species that are designated features of interest of nature conservation designations are assessed in relation to those designations and are not duplicated within this section.

Table 11.10: Summary of species relevant to the ecological impact assessment

Species	Value	Location of baseline information (ES Volume II)	Potential Relevance to the EcIA
Badger	-	Confidential **Appendix 11D**	See Confidential **Appendix 11D** (ES Volume II - **Application Document Ref. 6.3**).
Bats (foraging)	Local	**Appendix 11E**	Construction and operation of Main Site. May be relevant at decommissioning stage also, depending on

Species	Value	Location of baseline information (ES Volume II)	Potential Relevance to the EcIA
			methods and future baseline.
Breeding birds	Local to county	**Appendix 11C**, **Annex 11D**	Construction, particularly of Main Site. May be relevant at decommissioning stage also, depending on methods and future baseline.
Fish	Lamprey – international Atlantic salmon and European eel – regional All other species - local	**Appendix 11G**	Construction and operation of Proposed River and Canal Water Abstraction options and Discharge Corridor. May be relevant at decommissioning stage also, depending on methods and future baseline.
Flora (notable species)	Regional	**Appendix 11C**, Annex 11E	Dependent on habitats and habitat conditions potentially sensitive to ammonia and nitrogen deposition during operation.
Invertebrates: aquatic	Up to county	**Appendix 11G**	Construction of Main Site, construction and operation of Proposed Water Abstraction and Discharge Options. May be relevant at decommissioning stage also, depending on methods and future baseline.
Invertebrates: terrestrial	National	**Appendix 11C**, Annex 11G	Dependent on habitats and habitat conditions potentially sensitive to ammonia and nitrogen

Species	Value	Location of baseline information (ES Volume II)	Potential Relevance to the EcIA
			deposition during operation.
Reptiles (grass snake)	Local	**Appendix 11C**, Annex 11F	Construction of Main Site and Emergency Vehicle Access Road has low potential to affect grass snake if present on a transitory basis. May be relevant at decommissioning stage also, depending on methods and future baseline.
Water vole	Local	**Appendix 11F**	Construction of Main Site and associated Emergency Vehicle Access Road, and the laying of electrical connections. May be relevant at decommissioning stage also, depending on methods and future baseline.

11.4.13 For purposes of clarity, the following potential protected and notable species constraints are not relevant to the ecological impact assessment and are therefore not considered further:

- Great crested newt – no likelihood of presence (see **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**));
- Otter – no evidence found (see **Appendix 11F** (ES Volume II - **Application Document Ref. 6.3**)), precautionary mitigation still appropriate;
- Roosting bats – no suitable trees, buildings or cliffs present in the zone of influence (see **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**));
- Schedule 1 bird species – no suitable nesting and/ or roosting habitat in the zone of influence (see **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**)); and

- White-clawed crayfish – no relevant habitat impacts, not present in this part of Lincolnshire (see **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**)).

Future Baseline

Construction (2022-2026)

11.4.14 In the absence of the Proposed Development, it is predicted that the habitat context and management of the Proposed Development Site and adjacent land would remain as the current baseline. The approved soft landscaping scheme for the Keadby 2 Power Station would have been implemented but would still be establishing and is likely at best to have a biodiversity value consistent with comparable nearby habitats.

11.4.15 As no substantive changes in habitat context and condition are predicted, the species value of the Proposed Development Site and adjacent land would also remain consistent with the current baseline. Minor changes (upwards or downwards) in the distribution of some species, e.g. nesting birds, or water vole, may occur in line with small-scale changes in habitat structure as a result of ecological succession or other natural processes. Any such changes are likely to be within the range of normal inter-annual variation in the distribution and abundance of species populations. In addition, potentially relevant protected species (e.g. badger) could establish in new locations where they would impose new working constraints, due to a need to ensure compliance with the legislation protecting these species.

Operation (2026-2051)

11.4.16 The future ecological baseline at the start of operation would not differ substantively from that described above for construction, but change is possible over the anticipated operational life of the Proposed Development to circa 2051 (decommissioning).

11.4.17 Based on available information, there are no grounds to expect any marked change in local land management practice and associated habitats by the time of commencement of operations. The short-term baseline described above for construction is equally applicable to the start of operation. Over the medium-term operational life of the Proposed Development, semi-natural habitats, including any new habitats accompanying the Proposed Development, will have matured and in the absence of preventative management, are likely to be subject to successional change e.g. progression of grassland towards scrub or scrub towards woodland. Where land-use management practices remain unchanged, no substantive change in the habitat baseline would be reasonably anticipated.

11.4.18 There are a variety of nature conservation designations in the vicinity of the Proposed Development Site. It is impossible to state with certainty how the

nature conservation value of these designations might change over the medium to long term operational period, and this would ultimately depend on long-term management regimes. Factors likely to influence (positively or negatively) the integrity and nature conservation value of designations will depend on the suitability of land management regimes, development pressures, and over the longer term climate change and anticipated improvements in air quality as pollutants decrease due to changes in technology and the types of emissions sources[2]. For national designations, there will remain a legal obligation to maintain or achieve (where this is failing) favourable condition, so the condition of these designations needs to be assumed to be stable or improving over time.

11.4.19 The assemblage of migratory fish in the River Trent is anticipated to gradually improve over time due to the removal of weirs and other barriers upstream in the wider catchment. Therefore, the river reach associated with the Proposed Development is likely to have an increased functional importance for migratory fish trying to access spawning grounds upstream. While any substantive change in fish stocks is unlikely by the time of first commercial operation, incremental medium-term improvements may be achieved over the operational life of the Proposed Development.

11.4.20 Other general medium-term improvements in the biological quality of the River Trent may occur over time due to WFD requirements (see **Chapter 12**: Water Environment and Flood Risk (ES Volume II - **Application Document Ref. 6.2**)). The WFD requires all waterbodies to achieve 'good ecological status' by 2027 (which is defined with reference to quantifiable parameters relating to ecological, hydromorphological, physico-chemical and chemical condition) and to experience no deterioration in status. Good ecological status by 2027 is therefore to be assumed.

Decommissioning (post 2051)

11.4.21 The future baseline conditions in the vicinity of the Proposed Development are likely to be similar to the anticipated medium-term operational baseline and the same assumptions would apply. Ongoing incremental improvements or successional changes in the quality of the River Trent and other habitats created at a time contemporaneous with construction or operation, can reasonably be anticipated.

11.4.22 The above acknowledged, much of the land relevant to decommissioning activities will be within the built footprint of the Proposed Development Site. Therefore, the baseline conditions relevant to decommissioning will be less

[2] The UK's Clean Air Strategy (DEFRA, 2019), details commitments to monitor impacts of air pollution on habitats and reduce the levels of damaging deposition of reactive forms of nitrogen by 17% over England's protected priority habitats by 2030.

ecologically sensitive that those relevant to construction. Similarly, they will also be less ecologically sensitive than the baseline conditions relevant to operation, given the potential zone of influence of decommissioning activities will be considerably reduced compared with operational activities. Development Design and Impact Avoidance.

11.5 Development Design and Impact Avoidance

11.5.1 The design process for the Proposed Development has included consideration of biodiversity constraints and has incorporated, where reasonably practical, measures to reduce the potential for adverse effects on these, in accordance with the 'mitigation hierarchy' (see **Appendix 11B**: Ecological Impact Assessment Methods (ES Volume II – **Application Document Ref. 6.4**)) and relevant planning policy. The measures identified and adopted include those that are inherent to the design of the Proposed Development, and those that can realistically be expected to be applied as part of construction, operational or decommissioning environmental best practice, or as a result of legislative requirements.

11.5.2 Measures to deliver compliance with industry good practice and environmental protection legislation during both construction and operation (e.g. in relation to prevention of surface and groundwater pollution, fugitive dust management, noise prevention or amelioration) can be assumed in accordance with NPS EN-1 paragraph 4.10.3. It must be assumed that all measures available to regulators to secure such requirements will be properly applied and enforced by the relevant regulators. Most of the measures required are already committed and are set out in the Framework Construction Environmental Management Plan (CEMP) which accompanies the DCO Application (**Application Document Ref. No. 7.1**).

11.5.3 Similarly, it must be assumed that all relevant protected species legislation will be complied with, as this is mandatory. However, to assist transparency on what is likely to be required, suitable measures to comply with relevant protected species legislation are summarised below and include attainment of all necessary licences and permits. These requirements are also appropriately captured in the Framework CEMP.

11.5.4 The additional development design and impact avoidance measures that have been, or would be, adopted during the construction, operation and decommissioning of the Proposed Development are described below.

Construction

11.5.5 Additional land required for construction laydown has been informed by ecological appraisal, such that it avoids, as far as reasonably practicable, areas of high-quality habitat and instead comprises land of relatively low ecological sensitivity. The latter includes previously developed land and land under intensive agricultural management (refer to Section 6.6 of **Chapter 6**:

Consideration of Alternatives (ES Volume I - **Application Document Ref. 6.2**)).

11.5.6 The Additional Abnormal Indivisible Load (AIL) route and temporary laydown area established for the construction of Keadby 2 Power Station will be re-used for the Proposed Development. This will result in a minor extension in the duration of temporary use of these areas (approximately 3-4 years), with a consequent comparable delay in delivering the existing approved habitat restoration in these areas. However, this is considered acceptable, given the original relatively low baseline value of the habitats affected by construction of Keadby 2 Power Station, and because it reduces a need to disturb additional areas of habitat for construction of the Proposed Development. Delayed restoration would be less adverse for biodiversity and nature conservation than additional new temporary land-take.

11.5.7 The routing of the River Water Abstraction Option and Water Discharge connection corridors utilises existing infrastructure where possible. If upgrades to existing pipework are required, trenchless excavation methods ('sliplining') would be applied in areas of higher sensitivity as described in **Chapter 5**: Construction Programme and Management (ES Volume I – **Application Document Ref. 6.2**). This approach minimises excavations and construction activities required and therefore the potential for disturbance of species and habitats.

11.5.8 If the Proposed Canal Water Abstraction Option on the Stainforth and Keadby Canal is chosen as the cooling water abstraction point, this will be constructed within the same area of unvegetated ground used for construction of the cooling water intake for the Keadby 2 Power Station.

11.5.9 All watercourses will be protected and subject to appropriate stand-offs (including those associated with proposed temporary construction laydown areas) except where construction works have been identified as necessary within **Chapter 4**: Proposed Development or **Chapter 5:** Construction Programme and Management (ES Volume I - **Application Document Ref. 6.2**), and as assessed within this chapter. Any impact on such watercourses will be minimised and appropriate mitigation will be adopted, as set out in **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**).

11.5.10 The installation and subsequent removal of the single temporary cofferdam required to enable construction (depending on the chosen option) of the Proposed Canal Water Intake (including eel screens) or the upgrade of the Proposed River Water Intake will be completed in accordance with the requirements of the relevant regulators, including (if relevant) restriction of piling works to avoid the main migratory periods of noise and vibration sensitive fish species (which is September to November) and restricting piling works to core daytime hours to minimise potential impacts on migrating fish.

11.5.11 Appropriate measures will be used to limit silt mobilisation and potential for scour, if appropriate, during the installation and removal of the temporary cofferdam, should the River Water Abstraction Option be chosen. Further information on the measures that would be applied to protect the water environment and its dependent habitats and species is provided in **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**).

11.5.12 An Ecological Clerk of Works (ECoW) would be employed, as committed in the Framework CEMP (**Application Document Ref. No. 7.1**), to supervise and manage the implementation of measures to mitigate impacts on ecological features, including protected species, prior to and during the construction phase. This would encompass both licensed and relevant unlicensed activities.

11.5.13 Construction temporary lighting will be designed so that excessive glare is minimised outside of the construction site as far as reasonably practicable. Measures to minimise light disturbance to ecological receptors are detailed in the Indicative Lighting Strategy (**Application Document Ref. 5.11**).

11.5.14 All habitats disturbed during construction, such as land within the temporary construction laydown areas, electricity connection route and proposed abstraction/ discharge corridor, would be reinstated where reasonably practicable on a like-for-like basis at the same location following construction.

11.5.15 Updated ecological surveys would be completed prior to the start of construction, where necessary, to gain up to date information on relevant protected or notable species whose status or distribution may have changed since baseline surveys were completed (e.g. badger). This would be required to inform protected species licence applications (where necessary), or otherwise to determine appropriate mitigation requirements. Based on current data a water vole licence may be required prior to infilling of the drain within the Main Site, as a single territory was found. However, the status of water vole could change (decrease or increase) prior to construction so the need for a licence would need to be confirmed prior to construction. No other licences are likely to be required.

11.5.16 The following measures would also be undertaken prior to and during construction for the purposes of avoiding impacts on the named species and to comply with relevant legislation.

Water Vole

11.5.17 A Water Vole Impact Avoidance Strategy will be prepared, using updated baseline information, and agreed with relevant stakeholders to specify the measures and supervision required to deliver legislative compliance during construction of the Main Site and watercourse crossings. The Water Vole

Impact Avoidance Strategy is part of the Framework CEMP (**Application Document Ref. No. 7.1**).

11.5.18 The Water Vole Impact Avoidance Strategy will include details of:

- requirements for further surveys (or the results of further surveys completed in advance to inform the Strategy), ongoing monitoring and attendance by an appropriately experienced ECoW;
- requirements for licences to permit the relevant construction works to proceed;
- appropriate construction stand-offs from watercourses that will be maintained at all times (retained watercourses) or, in the case of watercourse crossings, until such time that the ECoW advises that the relevant construction works can proceed;
- appropriate timings to meet the terms of any necessary licences. Specifically, use of displacement methods at locations of bridge crossings is constrained to the period 15th February to 15th April;
- requirements for habitat provision to accommodate any water voles displaced as a result of the Proposed Development. The current baseline data indicates that existing habitats are adequate to absorb displaced water voles as this species is only present in small numbers and patchily distributed. Habitat enhancement is also committed to improve wider habitat suitability;
- requirements (if further pre-construction surveys deem this to be relevant) for trapping, exclusion and relocation of water voles from relevant construction areas (based on current levels of water vole activity, adjacent retained areas of drains are anticipated to be sufficient to accommodate any water voles displaced – refer to Section 11.6 impact assessment); and
- site inductions and toolbox talks as appropriate.

Breeding Birds

11.5.19 The following approach would be taken to deliver legislative compliance in relation to nesting birds:

- all clearance of suitable vegetation will be undertaken outside the breeding season (typically March-August inclusive for most species), where reasonably practicable;
- site inductions and toolbox talks as appropriate; and
- in situations where the above breeding bird mitigation is not possible, the ECoW would check the working area for nests before works commence. If active nests are discovered through this process, then the ECoW will

advise on appropriate mitigation to ensure that these are not impacted by construction activities. All relevant works would be completed in accordance with this advice and under the supervision of an ECoW.

Fish

11.5.20 A Fish Management Plan will be prepared and agreed with relevant stakeholders to specify the measures and supervision required to deliver legislative compliance during installation and drawdown of any cofferdam(s) for the upgrade of the River Water Abstraction Option (if chosen) or the Canal Water Abstraction Option on the Stainforth and Keadby Canal. Prior submission and approval of the Fish Management Plan is a commitment within the Framework CEMP (**Application Document Ref. No. 7.1**).

11.5.21 The Fish Management Plan will include details of:

- appropriate timings to minimise potential for disturbance to migratory fish;
- provision for screening of pump intakes to prevent fish being drawn into the pipe/pump;
- supervision of dewatering of any cofferdam(s) by an appropriately experienced ECoW to oversee fish welfare and to support the relocation of any stranded fish or associated wildlife back to the main channel of the relevant watercourse outside the working area; and
- if appropriate, other specialist techniques to support the capture and relocation of fish to the main channel of the relevant watercourse outside the working area prior to drawdown.

General Animal Welfare during Construction

11.5.22 Vegetation clearance and construction excavations have potential to affect wildlife and may result in offences under animal welfare legislation if not appropriately managed. An ECoW would be employed to supervise all relevant works to provide guidance on the measures required day-to-day to deliver legislative compliance.

11.5.23 Excavations would be covered or fenced overnight, or where this is not practicable, a means of escape would be fitted e.g. battered soil slope or scaffold plank, to allow any animals (e.g. reptiles, badger, otter, brown hare, hedgehog) that may stray into the construction site to vacate excavations, should they fall in.

11.5.24 The above measures are committed within the Framework CEMP (**Application Document Ref. No. 7.1**)

Invasive Species Management Plan (ISMP)

11.5.25 A plant INNS survey will be undertaken prior to construction to determine the current location and extent of plant INNS. If determined as necessary through this survey and after consideration of other available plant and animal INNS data, an ISMP will be prepared to accompany the final CEMP and would be agreed with relevant stakeholders. The ISMP would specify the measures and supervision necessary during construction to prevent the spread of plant and animal INNS to new locations. This approach is included as a commitment within the Framework CEMP (**Application Document Ref. No. 7.1**).

Operation

11.5.26 An eel screen (2mm mesh size) will be installed during the construction or upgrade (depending on the location selected) of water supply infrastructure to meet the specification advised by the Environment Agency to achieve compliance with the Eels (England and Wales) Regulations 2009 and other relevant legislation and regulatory requirements during operation of the Proposed Development (refer to **Chapter 4**: The Proposed Development, ES Volume I - **Application Document Ref. 6.2**). The proposed screen mesh size, in combination with the proposed water intake velocity of less than 0.3m/sec, is suitable to protect all life stages of eel and therefore is also suitable to protect all other fish species including juvenile river and sea lamprey. A water intake velocity of less than 0.3m/sec allows even the most sensitive (weakest swimming) fish species (eel and lamprey juvenile life stages) to achieve 'escape velocity' (Environment Agency, 2005) when passing the location of the water intake. The final design will be based on a BAT assessment in accordance with the Joint Environment Protocols.

11.5.27 Cooling water will be discharged at a rate and with a chemical water quality compliant with the discharge limits set by the Environment Agency within the Environmental Permit, considering Best Available Techniques (BAT) for those discharges.

11.5.28 Lighting impacts on sensitive ecological features (e.g. the former Keadby Ash Tip) would be minimised as far as reasonably practicable for example by directing lighting away from adjacent habitats in accordance with the Indicative Lighting Strategy (**Application Document Ref. 5.11**).

11.5.29 Ground-level air quality impacts on relevant biodiversity and nature conservation features will be minimised through the use of appropriate stack height(s) to optimise dispersion of pollutants, and emissions monitoring to demonstrate continued compliance with emission limit values (ELV) set by the Environment Agency. **Chapter 8**: Air Quality (ES Volume I - **Application Document Ref. 6.2**) describes the results of atmospheric dispersion modelling which have informed the stack heights set out in **Chapter 4**: The Proposed Development (ES Volume I - **Application Document Ref. 6.2**).

Decommissioning

11.5.30 Decommissioning would require submission of a Decommissioning Environmental Management Plan (DEMP) for the approval of the relevant planning authority and will be secured by a Requirement of the draft DCO (**Application Document Ref. No. 2.1**). Appropriate best practice mitigation measures, including measures to deliver compliance with nature conservation legislation applicable at that time, will be applied during any decommissioning works as documented in the DEMP. No additional mitigation for decommissioning of the Proposed Development beyond such best practice is considered necessary at this stage.

11.6 Likely Impacts and Effects

11.6.1 This section describes the likely impacts and effects of the Proposed Development on relevant biodiversity and nature conservation features in the absence of any mitigation over and above that which is inherent to the design or otherwise mandatory for purposes of legislative and regulatory compliance (as described in Section 11.5).

11.6.2 This assessment takes account of policy given in NPS EN-1 (paragraph 4.10.3). This states: "*in considering an application for development consent … focus on whether the development itself is an acceptable use of the land, and on the impacts of that use, rather than the control of processes, emissions or discharges themselves. … work on the assumption that the relevant pollution control regime and other environmental regulatory regimes, including those on land drainage, water abstraction and biodiversity, will be properly applied and enforced by the relevant regulator*."

11.6.3 In accordance with this policy, while it remains necessary to assess impacts and effects of emissions to air arising from construction and operation of the Proposed Development, comparable assessment is not extended to other potential pollution sources that are sufficiently addressed though mandatory compliance with legislation, otherwise covered by regulatory regimes in place to control pollution, and/ or the mitigation otherwise committed in **Chapter 8**: Air Quality, **Chapter 9:** Noise and Vibration and **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**).

11.6.4 In making this assessment, regard has been given to other relevant ES chapters, specifically **Chapter 8**: Air Quality, **Chapter 9**: Noise and Vibration and **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**). It is not considered necessary in this chapter to replicate the detailed impact assessments provided in these chapters. This chapter instead restricts its scope to the relevant points, while signposting where the underpinning data and more detailed assessment can be found. Where mitigation has been identified as necessary in other

chapters to address and remove potential significant adverse effects then it represents a formal commitment and is captured in the Commitments Register (**Appendix 20A:** Commitments Register (ES Volume II - **Application Document Ref. 6.3**)). Implementation of this mitigation can therefore be assumed, and it will be delivered as outlined in the relevant chapter and/ or as specified in the Framework CEMP (**Application Document Ref. 7.1**).

11.6.5 Relevant biodiversity and nature conservation features are those that are considered to be of local or higher geographic value, and which have potential to be affected by the Proposed Development as summarised in Section 11.4 of this chapter.

Construction

Humber Estuary SSSI, SAC and Ramsar site

11.6.6 The potential impact pathways relate to construction air quality impacts and the proposed upgrade works, including installation of the cofferdam, for the Potential River Water Abstraction Option on the River Trent (if required). Specifically:

- potential air quality impacts (dust deposition and NO_x) on habitats for which the Humber Estuary is designated;
- potential localised very small-scale temporary de-watering and disturbance of intertidal mudflat and/ or subtidal benthic habitats;
- potential barrier and underwater sound impacts on lamprey species for which the Humber Estuary SSSI and Ramsar site is designated; and
- disturbance and associated very small-scale and temporary loss of habitat for breeding, passage and wintering birds for which the Humber Estuary SSSI and Ramsar site is designated.

11.6.7 Use of the Waterborne Transport Off-loading Area is not considered likely to result in significant impacts and effects given this is an existing facility operated for this purpose as part of the existing port infrastructure at Keadby. It is noted that the load bearing capacity of the wharf and crane pads has recently been upgraded to facilitate the delivery of AIL for the Keadby 2 Power Station construction and a record of determination provided. This recorded no likely significant effects on the Humber Estuary SSSI, SAC and Ramsar site. No upgrades to the wharf or equipment would be required for the Proposed Development and no works are proposed within the Humber Estuary SSSI, SAC and Ramsar site (an oversail for mobile cranes has been included in the Proposed Development Site boundary only).

11.6.8 Potential construction air quality impacts are identified in **Chapter 8**: Air Quality (ES Volume I - **Application Document Ref. 6.2**) in relation to dust

and NO_x. However, this can be scoped out following review of the habitats in the potential zone of influence of construction air quality impacts i.e. estuaries (encompassing the main river channel) and mudflats and sandflats not covered by seawater at low tide (encompassing the marginal mud banks exposed at low tide). The relevant habitats are therefore those that are either permanently submerged, or periodically exposed and re-submerged as part of the normal tidal cycle.

11.6.9 Any dust deposited in these circumstances would add trivially to the existing high sediment load already carried by the estuary. There is no mudflat vegetation present in the study area that could experience dust deposition at low tide and, even if there was, this would be removed at the next tide through water movement and wave action. Regardless, embedded good practice mitigation is committed in **Chapter 8**: Air Quality (ES Volume I - **Application Document Ref. 6.2**) to limit potential for fugitive dust to occur and by so doing protect human receptors adjacent to the Humber Estuary.

11.6.10 In relation to NO_x, the Air Pollution Information System (APIS) specifies a critical NO_x concentration (critical level threshold) for the protection of vegetation of 30µgm^{-3}. This critical concentration would only be exceeded at one of the 20 locations modelled for the Humber Estuary SAC and Ramsar site, with 46.6µgm^{-3} predicted at 5m from the affected road network. While the critical level is predicted to be exceeded as a result of the Proposed Development this does not automatically mean there would be an impact, only that this needs further consideration. The relevant habitats at this location, estuary and mudflats, do not support vegetation so the exceedance of the critical level set for NO_x is not relevant. The absence of vegetation means NO_x can be scoped out.

11.6.11 Most of the construction work for the Potential River Water Abstraction Option upgrade would be located within the existing concrete apron of the existing Keady 1 Power Station intake, but a cofferdam is required to permit dewatering to provide safe access. The affected habitat is within the main channel of the river but outside the navigable area and typically remains submerged at low tide, although a very narrow strip (c.1-2m width) of periodically exposed bare mudflat may also be present at the margin of the river channel to either side of the existing concrete apron.

11.6.12 As further explained in **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**), the installation and use of the cofferdam, if required, minimises the potential for biodiversity, including designated features of interest, to be adversely affected. Use of a cofferdam to create and maintain a dry in-channel working area will help to reduce overall channel disturbance and sediment generation. The cofferdam will also be appropriately designed to minimise potential for changes in riverbed and bank erosion and toe scour over the duration of its use.

11.6.13 Other bank protection measures will also be applied as good practice embedded mitigation, if needed, to further reduce the potential for erosion and scour impacts (**Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**)). On that basis, there would be no likely potential for the adjacent and downstream channel and banks to be adversely affected by construction works. Even if sediment was generated during installation of the cofferdam, it is considered that this would not be ecologically damaging in the context of a highly turbid tidal river reach. Previous WFD assessments (e.g. AECOM, 2015) of dredging operations at the same locations concluded no likely significant adverse effects on water quality or water biodiversity. The proposed construction works are of broadly comparable or lesser extent and scale to these previous dredging works and therefore the findings of these previous assessments remain valid for the Proposed Development. It is therefore considered that sediment generation, if this were to occur, would not adversely affect the nature conservation status of in-channel habitats or the integrity of the Humber Estuary SSSI, SAC and Ramsar site designations.

11.6.14 Construction works have the potential to directly and indirectly reduce the extent and quality of intertidal mudflat habitats in the immediate vicinity of the River Water Abstraction Option cofferdam (if required) e.g. through the drying of sediments behind the cofferdam. However, any such impact would be temporary. The indicative extent of the cofferdam is illustrated in Figure 12C.8 of **Appendix 12C**: Navigational Risk Assessment (ES Volume II – **Application Document Ref. 6.3**). However, the area of habitat affected is negligible in the context of the size of the Humber Estuary and the extent of comparable intertidal mudflat habitats (worst-case estimate of 0.13ha (<0.01%) in the Proposed Development Site, compared to 9,384ha stated on the citation for the Humber Estuary SAC). It can be certain that any impact would be temporary as natural tidal processes will rapidly reintroduce sediments and reinstate mudflats once any cofferdam is removed on the completion of works. Mudflats can be expected to recover rapidly from temporary disturbance (Elliott *et al*. 1998; Natural England, 2020) through recharge with sediments present in the local area and through wider tidal movements, within 2 to 5 years. Given this, it is considered that the construction works for the River Water Abstraction Option, (if required) will not adversely affect the conservation status of mudflat habitats along this section of the River Trent or the integrity of the Humber Estuary SSSI, SAC and Ramsar site designations.

11.6.15 The above assessment indicates that habitat quality for the birds for which the Humber Estuary SSSI and Ramsar site are designated is unlikely to be adversely affected. Losses of bird habitats (mudflat) would be very small-scale and of limited duration, and likely within the limits of natural inter-annual variation in habitat quality and extent. Following completion of any construction works, if required, for the River Water Abstraction Option,

comparable habitat structure and function for birds would rapidly re-establish as described above.

11.6.16 Construction works might also affect birds through disturbance and displacement when using adjacent habitats e.g. adjacent mudflats at low tide. However, the potential disturbance zone of influence, (noting that piling operations are likely to give rise to the most disturbance), is considered small-scale in the context of the full extent of comparable habitats for birds in the wider designations. In addition, habitat extent and quality for breeding, passage and wintering birds is limited in the zone of influence of the Proposed Development, being restricted to narrow stands of common reed and narrow marginal mudflats. Habitat quality for the bird species and assemblages named on the SSSI and Ramsar site citations is therefore relatively limited within the Proposed Development Site and, given this, it is considered that the bird interest of these designations will be concentrated in habitats located elsewhere within the boundaries of these large designations. This is supported by the boundary defined for the Humber Estuary SPA, which is designated for a comparable bird assemblage to the SSSI and Ramsar site but is located 9.8km from the Proposed Development. As the SPA is a bird specific designation, this strongly indicates that the habitats of greatest importance for birds are those located at distance and that inclusion of the River Trent in the boundary of the SSSI and Ramsar site is for other reasons (such as habitats and lamprey species). Accordingly, it is considered that any construction disturbance, should this occur (e.g. during installation of cofferdams), would not adversely affect the nature conservation status of these bird species and assemblages relevant to the designations.

11.6.17 The Proposed Development is located in a position along the River Trent where, in the event that the River Water Abstraction Option is required, construction activities could have a temporary impact on the ability of lamprey species to access breeding habitats in the wider River Trent catchment as a whole, and to return to the Humber Estuary from these habitats (for the assessment of other fish species see later in this chapter, as they are not reasons for designation).

11.6.18 The only potential mechanisms for construction impact are through injury, mortality or disturbance from underwater sound and vibration from piling for a cofferdam, and entrapment behind the cofferdam and associated dewatering.

11.6.19 Once any cofferdam is in place, it will not pose a barrier to lamprey movements along this section of river given that it would extend no more than 22m into the river channel from the western bank of the River Trent. This is a relatively small distance in the context of a river channel that is circa 150m wide, so lamprey species will still be able to move along the channel past the length of any cofferdam without impedance.

11.6.20 The basis for the required assessment of underwater sound and vibration is **Appendix 11H**: Underwater Sound Effects on Fish (ES Volume II – **Application Document Ref. 6.3**). This also identifies relevant ameliorating factors related to restrictions on construction timings, methods (particularly 'soft start'), and the duration of and restrictions on the progression of piling. This detailed assessment concludes that an adverse effect on the conservation of status of lamprey species during piling is not likely. This is because lamprey species are of inherently low sensitivity to underwater sound. Therefore, no mortality, injury or meaningful barriers to the movement of lampreys is considered likely as a result of construction underwater sound and vibration.

11.6.21 Given this primary conclusion it is not necessary to restrict cofferdam installation to avoid potential for overlap with migrating lampreys (given their inherent low sensitivity to underwater sound). This is also not practical, given conflicting timing requirements for more sensitive and therefore relevant migratory fish species (Atlantic salmon). However, as further evidence against the potential for an adverse effect on the conservation status of lamprey species, the following is noted:

- The timing of piling works to avoid the Atlantic salmon migratory period of September to November beneficially reduces potential for overlap with the migratory period for adult river lamprey. This sensitive timing is specified in the Framework CEMP (**Application Document Ref. 7.1**);
- Essential mitigation for other fish species, particularly soft start and restrictions on the timing of piling and other construction activities (see **Appendix 11H** (ES Volume II – **Application Document Ref. 6.3**)), does much to restrict the potential for and duration of adverse underwater sound levels; and
- Piling would be an intermittent activity because of the need for soft start and also stops for other construction activities including safety checks, bracing and addition of pile ties. Given this, the peak in underwater sound production would be maintained only for relatively short periods of time (between 15 minutes and 1 hour).

11.6.22 Given the above considerations (both low lamprey sensitivity and restrictions on piling), no adverse effect on the conservation status of lamprey species is likely as a result of direct and indirect barriers to migratory movements.

11.6.23 Lamprey species could also be trapped within any cofferdam used and be affected by dewatering. However, appropriate measures will be set out in the Fish Management Plan to minimise this risk and deliver legal compliance (see Section 11.8). Allowance for this is included within the Framework CEMP (**Application Document Ref. 7.1**). Further, the cofferdam would need to be installed in a manner that delivers legislative compliance with a deemed marine licence (DML) under Part 4 of the Marine and Coastal Access

Act 2009, which is proposed to be secured as part of the draft DCO (**Application Document Ref. 2.1**). The MMO is responsible for enforcing, post-consent monitoring, varying, suspending, and revoking any deemed marine licence(s) as part of the DCO. It must therefore be assumed that regulatory regimes will be properly applied and enforced by the relevant regulators (Department of Energy and Climate Change, 2011). Therefore, this is also unlikely to adversely affect the nature conservation status of lamprey species. Put simply, the use of cofferdams is controlled through regulation and conditions of a DML must be met, so there is no likely scenario whereby non-compliant use of a cofferdam could occur to the detriment of fish, including lamprey species. Consequently, there is no scenario whereby fish could become trapped and would not be appropriately addressed as part of the standard construction approach.

11.6.24 After taking account of all relevant potential impact pathways, the potential construction effect on the Humber Estuary SSSI, SAC and Ramsar site is assessed as **negligible (not significant)**.

Other European Sites and National Nature Conservation Designations

11.6.25 Based on consideration of possible impact pathways and the findings of **Chapter 8**: Air Quality, **Chapter 9**: Noise and Vibration and **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**), there are no likely significant direct or indirect construction impacts and effects on any other statutory nature conservation designations set out in Table 11.7. In relation to the European Sites, the HRA Screening Report (**Application Document Ref. 5.12**) also concludes no likely significant effects.

Non-Statutory Nature Conservation Designations - Stainforth and Keadby Canal Corridor LWS

11.6.26 The Stainforth and Keadby Canal Corridor LWS is a 10km long watercourse and habitat corridor designated, and of county nature conservation value, for its aquatic and wetland plant interest, and the associated ancillary bank-top scrub and grassland habitats that supplement the biodiversity value of the LWS. The habitat and species conditions present within the LWS where they coincide with the Proposed Development Site are described in **Appendices 11C, 11F and 11G** (ES Volume II - **Application Document Ref. 6.3**).

11.6.27 The LWS will be directly affected by construction of the Proposed Development if the preferred Potential Canal Water Abstraction Option on the Stainforth and Keadby Canal is selected as the proposed water supply for the Proposed Development. It is proposed that a new water intake structure would be constructed directly adjacent to the intake constructed to supply Keadby 2 Power Station.

11.6.28 At this location, the banks are vertical and reinforced, so there is no marginal vegetation present that could be affected. The recently completed construction works for Keadby 2 Power Station also means that there is no vegetation established within the land required for construction. There are no formal plans to restore this area after construction, so bank-top habitats can be expected to be gradually colonised by ruderal and scrub vegetation if the existing hardstanding is not maintained, and the potential for in-channel marginal vegetation to establish will remain limited due to the existing characteristics of the canal banks.

11.6.29 Assuming this preferred option is selected, construction of the Proposed Development has only very limited potential to affect the designated biodiversity interest of the LWS through small-scale temporary loss and disturbance of existing in-channel habitats of low floristic diversity and structural complexity within an area extending up to 10m into the channel, and associated dewatering.

11.6.30 The potential worst-case impact on the nature conservation status and integrity of the Stainforth and Keadby Canal LWS would be adverse at no greater that the local level, given the habitat conditions present and existing limitations on vegetation establishment, the large size of the LWS, and the presence of the Keadby 2 Power Station water intake structure. Therefore, the potential construction effect on the LWS is assessed as negligible **(not significant)**.

11.6.31 Some of the proposed new native grassland habitats to be provided as part of the Landscape and Biodiversity Management and Enhancement Plan (**Application Document Ref. 5.10**) is located to abut the LWS at North Pilfrey Bridge. It will therefore enhance the habitat corridor for which the LWS is designated.

Non-Statutory Nature Conservation Designations - Hatfield Waste Drain LWS

11.6.32 Replacement of the existing open span Mabey Bridge over the LWS at the Proposed Development Site entrance off the A18 will require disturbance to the banks of the LWS within the footprint of and immediately adjacent to the existing bridge. Installation of a new open span steel decked bridge (**Application Document Ref. 4.16**) will require localised ground excavation to construct foundations for the replacement bridge, but these works will not affect the banks of the drain as the new foundations are set back from the existing foundations (i.e. located further away from the LWS). They are also largely restricted to the footprint of the existing bridge.

11.6.33 The area of bank vegetation (species-poor grassland and stands of common reed) affected would be very small in the context of the LWS, which is 10.3km long and therefore has over 20km of associated bank habitat. The existing bank vegetation is already affected to a large extent by the existing bridge

structure, which spans above and casts shade over the drain bank at the location where the replacement bridge will be constructed.

11.6.34 Any areas of bank temporarily disturbed during these works would be re-sown as far as reasonably practical and if deemed necessary with a suitable grassland seed mixture to stabilise the banks after which other flora will colonise from immediately adjacent areas. Further details of this approach are set out in the Landscape and Biodiversity Management and Enhancement Plan (**Application Document Ref. 5.10**).

11.6.35 Once the replacement bridge is in place and habitat reinstatement has been completed, then the LWS would be expected to return to a condition consistent with the existing baseline conditions with circa 1 year.

11.6.36 Therefore, the minor construction works for the Proposed Development will not adversely affect either the integrity of the LWS or the nature conservation status of its habitats. Given this, the potential construction effect on the LWS is assessed as negligible (**not significant**).

11.6.37 Some of the proposed new native grassland habitats to be provided as part of the Landscape and Biodiversity Management and Enhancement Plan (**Application Document Ref. 5.10**) is located to abut the LWS on the northeast side of Mabey Bridge. It will therefore enhance the habitat corridor for which the LWS is designated.

Other Local Nature Conservation Designations

11.6.38 Based on consideration of possible impact pathways and the findings of **Chapter 8**: Air Quality, **Chapter 9**: Noise and Vibration and **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**), there are no likely significant direct or indirect construction impacts and effects on any other local nature conservation designations.

Habitats - Ephemeral/ Short Perennial Vegetation and OMH

11.6.39 As described in **Chapter 6**: Consideration of Alternatives (ES Volume I – **Application Document Ref. 6.2**) the layout of the Proposed Development and choice of temporary construction laydown areas has been configured to avoid as far as practicable an impact on high quality ephemeral/ short perennial habitats. However, a small-scale loss cannot be avoided at the south-west corner of the Proposed PCC Site where there is a minor overlap with the margin of the former Keadby Ash Tip.

11.6.40 At this location, 0.25ha of ephemeral/ short perennial vegetation would be lost that is connected to, and therefore contributes to, a large area of high quality (national nature conservation value) OMH. This habitat loss represents 1.7% of the OMH within the former Keadby Ash Tip, with the remaining area retained unaffected.

11.6.41 The area of vegetation that will be lost is peripheral to the main area of OMH and has a relatively level compacted stone substrate due to it coinciding with an area used in the past as a vehicle access route. Therefore, while it is part of the OMH by virtue of its connection to the wider habitat resource, it lacks the characteristics of the wider habitat resource that result in its high value (i.e. varied topography, variable substrates, more complex vegetation structure). Without the context of its connectivity to the wider area of OMH, this discrete area would not be considered to be of national value as it does not have characteristics likely to sustain most of the flora and terrestrial invertebrates for which the wider habitat is of biodiversity value (see **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**)).

11.6.42 Following construction, it is anticipated that some of the area which has been disturbed will be suitable for the re-establishment of ephemeral/ short perennial vegetation, as there are peripheral areas within the Proposed PCC Site that will not be hard landscaped and there is no proposal to sow or plant these areas. Given this, exposed substrates in peripheral areas will be left to re-establish through natural processes and will remain connected to OMH on adjacent land. As the area of habitat that could re-establish cannot be quantified until detailed design, this area is not relied on for purposes of impact assessment. In other words, a permanent loss has been assumed.

11.6.43 The loss of habitat contributing to the wider OMH will not compromise the structure and function or conservation status of the wider OMH. This is because the affected area is small, peripheral and of sub-optimal condition. Therefore, the effect is assessed as meaningful at the local level only and therefore is minor adverse (**not significant**). The balance of permanent habitat losses and gains associated with the Proposed Development is considered further in **Application Document Ref. 5.10**.

Habitats - Scrub

11.6.44 There will be a permanent loss of 0.8ha of dense scrub of local nature conservation value for construction of the Proposed PCC Site, as well as likely minor losses of scattered bramble, hawthorn and dog-rose scrub of local nature conservation value where this coincides with localised areas required for temporary works (e.g. the laying of electrical connections).

11.6.45 It is considered that such minor losses of scrub would not be adverse for the nature conservation status of scrub habitats. Such habitats are common in the wider landscape and typically include a comparable suite of common shrub species.

11.6.46 Comparable dense scrub will be reinstated as part of the soft landscaping that will accompany the Proposed Development and is supplemented by new plantings of structurally comparable native hedgerow. These plantings would not be in the same location as the dense scrub that will be lost, but the new habitat will form part of a cohesive landscape and biodiversity strategy (see

Application Document Ref. 5.10) to enable a comparable biodiversity value to be re-established. In addition, scattered scrub would be able to recolonise existing areas affected by temporary construction and laydown activities as there are no management regimes proposed (over and above those described in the LBMEP) that would preclude this. No permanent losses of scrub habitat are therefore anticipated.

11.6.47 Given the above considerations, the small-scale loss of scrub to the Proposed Development is assessed as negligible (**not significant**).

Habitats - Watercourses

11.6.48 Watercourses referred to in this section are shown on Figure 11G.1 in **Appendix 11G** (ES Volume II – **Application Document Ref. 6.3**).

11.6.49 Construction of the Main Site would result in the loss of one minor field drain (Drain 4 – see Figure 11G presented in **Appendix 11G** (ES Volume II - **Application Document Ref. 6.3**)) of up to local biodiversity and nature conservation value. This drain is 400m long, does not hold permanent water and supports only a very limited diversity of aquatic and wetland plant species (four higher plant species only). However, it does have a minor value in terms of the contribution it makes to the wider network of field drains in the local area, and it connects to and, during periods of high water levels, provides water to other drains of higher nature conservation value. This includes Keadby Boundary Drain LWS located to the immediate north-west of the Main Site.

11.6.50 Given the limited existing biodiversity and nature conservation value of Drain 4, it is considered that the impact arising from habitat loss can be readily compensated through sensitive design of the surface water attenuation infrastructure required for the Proposed Development, and habitat enhancement works proposed to improve the quality of other similarly low value drains associated with the boundaries of the Main Site (refer to the construction impact assessment for water vole, in paragraph 11.6.60 below).

11.6.51 Construction also has the potential to affect Drain 1 (part of Glew Drain) located on the northern boundary of the Main Site which supports an assemblage of aquatic and wetland plants of county value (see **Appendix 11G** (ES Volume II - **Application Document Ref. 6.3**)). In order to comply with relevant internal drainage board (IDB) bylaws relating to the design of new bridges, a localised impact to the channel of the Glew Drain cannot be avoided during construction of a bridge crossing for the proposed Emergency Vehicle Access Road (refer to **Chapter 5**: Construction Programme and Management (ES Volume I – **Application Document Ref. 6.2**)). The IDB bylaws require that the bed of the drain to be lined with concrete below the bridge to impede the growth of rank vegetation under the bridge. The proposed design and construction sequence is shown on **Application**

Document Ref. 4.17. This minor impact is offset by the habitat enhancement works proposed on other drains nearby.

11.6.52 In addition, there are two other short sections of drain (a second section of Glew Drain and a section of Keadby Common Drain adjacent to Chapel Lane) that are crossed by and could be affected during construction of the Proposed Development as they coincide with the northern routing for a potential electrical connection to the Northern Powergrid 132kV Substation, (should this option/ route be chosen) and any upgrade works required to the existing track to provide an emergency access road from the northern boundary of the Main Site towards Chapel Lane (refer to **Figure 3.3** (ES Volume III - **Application Document Ref. 6.4**)). No other drains are likely to be affected by construction, as they coincide with existing infrastructure for the Keadby 1 and 2 Power Stations.

11.6.53 The above construction works are not likely to impact the nature conservation status of the aquatic and wetland plant assemblages associated with the above drains. Worst-case construction requirements would affect no more than 10 - 15m stretches of drain bank and channel at each crossing location. The worst-case combined habitat loss on Glew Drain would be 30m from a drain that is at least 1.7km long (1.8%). Therefore, assuming a worst-case, greater than 98% of the Glew Drain would remain suitable to support the aquatic invertebrate assemblage. In comparison, worst case construction works on the Keadby Common Drain adjacent to Chapel Lane and Glew Drain would affect up to 3% of this 0.5km long section of drain, leaving 97% unaffected.

11.6.54 Mandatory requirements to comply with relevant legislation, along with the requirements of permitting and regulatory regimes, are sufficient to prevent potential adverse impacts and effects on watercourse habitats (see further commentary on this in paragraph 11.6.2). Similarly, no other relevant terrestrial or wetland habitats are identified that require specific assessment within this section.

11.6.55 The loss of a 400m long drain (Drain 4) of local nature conservation value and additional localised and relatively small-scale permanent construction impacts on other drains of up to county nature conservation value would not affect the wider nature conservation status of drain habitats and their associated aquatic and wetland plant assemblages. Therefore, the impact is of local scale only and restricted to the immediate footprint of the relevant construction works. As such, the combined effect is assessed as minor adverse (**not significant**).

Bats

11.6.56 The only part of the Proposed Development Site where bats and their habitats could provide a relevant construction constraint is the Main Site. Baseline surveys in 2020 recorded very low levels of bat activity within

habitats on the boundary of, and adjacent to, the Main Site (see **Appendix 11E** (ES Volume II - **Application Document Ref. 6.3**)), but not within the Main Site. It is considered likely that this is because the habitats present within the Main Site are sub-optimal for bats (open improved grassland) and relatively unattractive, given the abundant resource of optimal bat foraging and commuting habitat in the wider adjacent landscape (including the habitat corridor along the Stainforth and Keadby Canal and the former Keadby Ash Tip).

11.6.57 There would be no impact on bat roosts as a result of construction of the Proposed Development, as no suitable trees or buildings are present within areas that would be affected by construction activities (**Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**)).

11.6.58 The loss of a single field drain (Drain D4) within Keadby Common represents the only permanent loss of habitat of potential importance to foraging and commuting bats. The survey results reported in **Appendix 11E** (ES Volume II - **Application Document Ref. 6.3**) identified no bat activity in association with this drain.

11.6.59 Construction temporary lighting is not considered a relevant potential impact on bats as the proposed core working hours during construction (07:00 to 19:00, see **Chapter 5**: Construction and Management (ES Volume I - **Application Document Ref. 6.2**). This mean that lighting is not likely to be routinely used during hours of darkness when bats are active (some limited construction may occur outside core hours when construction activities cannot be stopped, such as concrete pouring), or would only be used at times of year when bats are less active or in hibernation (i.e. over the winter months). Regardless, the survey data indicates that the consequences of any construction lighting impact on bats would be negligible given the very low levels of bat activity recorded in the vicinity of the Main Site, and given that lighting would be designed to minimise light disturbance, being directed to working areas so as not to illuminate foraging habitats adjacent to the Proposed Development Site of greater potential value to bats (e.g. the Stainforth and Keadby Canal habitat corridor). Requirements for construction lighting are set out in the Indicative Lighting Strategy which accompanies the DCO Application (**Application Document Ref. 5.11**).

11.6.60 Localised noise and vibration impacts during construction of the Proposed PCC Site are unlikely to meaningfully disturb bats or affect habitat usage. This is because the committed construction working hours largely preclude potential for construction activities to coincide with periods of bat activity. The limited bat activity recorded further supports this, as there is no evidence that the Proposed PCC Site or adjacent land is of specific importance for bats.

11.6.61 Given the above, it is assessed that there would be no likely effect on the nature conservation status of bat species and a bat assemblage of up to

district value. The potential construction effect on bats is assessed as negligible (**not significant**).

Water Vole

11.6.62 Water vole and its habitats have the potential to be a relevant construction constraint in the Main Site and in sections of Glew Drain and Keadby Common Drain that coincide with the northern routing for a potential electrical connection to the Northern Powergrid 132kV Substation (should this option/ route be chosen), and any upgrade works required to the existing track to provide an emergency access road from the northern boundary of the Proposed PCC Site towards Chapel Lane (refer to **Figure 3.3** (ES Volume III - **Application Document Ref. 6.4**)).

11.6.63 Baseline surveys in 2020 recorded limited evidence of water vole within the Main Site (see **Appendix 11F** (ES Volume II - **Application Document Ref. 6.3**)). Habitats in most of the drains associated with the Main Site were found to be sub-optimal for water vole due to a combination of summer drying (all but one drain was dry by the time of the August survey), succession to a relatively dry tall emergent plant community, and extensive over-shading from scrub.

11.6.64 Construction of the Main Site requires the permanent loss of the field drain (Drain D4 – see Figure 11F.1 presented in **Appendix 11F** (ES Volume II - **Application Document Ref. 6.3**)) within the centre of Keadby Common. This drain did not hold water at the time of the August water vole survey and was dominated by rank emergent vegetation. This drain only connects to other drains in the west via Drain 3, so does not provide a habitat linkage that allows water voles to move between other areas of suitable habitat. One water vole burrow (equivalent to one water vole territory) was recorded on this drain, and there would be a permanent loss of this burrow and the wider water vole habitat within this drain as a result of construction of the Proposed Development.

11.6.65 In addition, low levels of water vole activity were recorded from the drains on the northern (Drain 1) and southern (Drain 2) boundaries of the Main Site. Drain 1 (Glew Drain) holds permanent water and provides habitat connectivity with other drains located outside the Proposed Development Site. Drain 2 is less suitable, as it was dry at the time of the August survey and is heavily shaded along much of its length.

11.6.66 These drains need to be bridged for purposes of construction access or to provide a permanent emergency access route. It is anticipated that the existing access installed for Keadby 2 Power Station over Drain 2 can be retained or upgraded for use by the Proposed Development, however, a new bridge will be constructed over Drain 1 to provide a long-term emergency access route for the Proposed Development. Four water vole burrows and five latrines were recorded from Drain 1 (with their locations indicating a

maximum of four water vole territories as shown on Figure 11F.1 in **Appendix 11F** (ES Volume II - **Application Document Ref. 6.3**)), and three burrows and four latrines on Drain 2 (maximum of two water vole territories). The design of the proposed bridge crossings avoids habitat severance so water voles will still be able to access suitable habitats.

11.6.67 The minor works for the installation of the northern routing for a potential electrical connection to the Northern Powergrid 132kV Substation, (should this option/ route be chosen) could affect one or two water vole territories on each of the affected drains. The loss of habitat would be temporary and of short duration (less than 1 year), after which the affected sections of watercourse would be reinstated back to a condition suitable for use by water vole.

11.6.68 Based on current levels of water vole activity, the Proposed Development is not likely to result in the loss of water vole from the Proposed Development Site. There is sufficient unoccupied comparable habitat within the wider connected drain network around the Main Site to accommodate any water voles displaced by permanent or temporary habitat losses. In addition, the patchy distribution of water vole activity indicates that it should be possible to position watercourse crossings to avoid the loss of any existing water vole territories. However, this is dependent on the status of water vole remaining unchanged up until construction, and this is not certain (populations can decrease or increase over time). Given this the identified mitigation approach (see Section 11.5 of this chapter), as also committed within the Framework CEMP (**Application Document Ref. No. 7.1**), will be followed to achieve legislative compliance. This mitigation is also sufficient to preclude potential for a significant effect on the conservation status water vole and its habitats, as this not permissible under the relevant legislation. Appropriate mitigation is therefore a mandatory requirement of the relevant legislation.

11.6.69 Habitat enhancement for water vole will also be provided, resulting in an increase in habitat suitability within unoccupied drains associated with the Main Site. This will be achieved through scrub clearance to remove over-shading of the drain banks and removal of dense emergent vegetation to reinstate open water habitats, as set out in the Landscaping and Biodiversity Management and Enhancement Plan (LBMEP) that accompanies the DCO Application (**Application Document Ref. 5.10**). Options to secure further enhancement for water vole and other aquatic biodiversity will be considered when undertaking the detailed design of the surface water run-off attenuation basin. The detailed design of the attenuation basin will be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**).

11.6.70 Taking the above into account, it is considered that construction of the Proposed Development can be achieved while retaining habitat and habitat connectivity for the existing small population of water voles associated with the drains within the Main Site. Given this, and mandatory requirements for

appropriate mitigation to deliver legislative compliance (as detailed is Section 11.5), there would be no likely impact on the nature conservation status of water vole. The potential construction effect on water vole is assessed as negligible (**not significant**).

Badger

11.6.71 See **Appendix 11D**: Confidential Badger Report (ES Volume II - **Application Document Ref. 6.3**). Based on the findings of this report, the potential construction effect on badger is assessed as negligible (**not significant**).

Grass Snake

11.6.72 Construction works at the Main Site would result in the loss of a field drain and 10.1ha of species-poor grassland habitats with the potential for occasional and transitory use by small numbers of grass snake. Similarly, while there is negligible habitat suitable for grass snake elsewhere in the Proposed Development Site, the possibility of occasional and transitory occurrences cannot be discounted, particularly in relation to habitats adjacent to the River Trent and the Stainforth and Keadby Canal (see **Appendix 11C**: PEA Report (ES Volume II - **Application Document Ref. 6.3**)).

11.6.73 The habitat impact and its consequences for grass snake as a consequence of the Proposed Development would be negligible given the limited habitat loss and/ or the existing quality of this habitat for grass snake, and the occasional and transitory use of this habitat as part of a much wider resource of suitable accessible habitats for grass snake, including those associated with the adjacent former Keadby Ash Tip. Therefore, construction works would not impact the structure and function of grass snake habitats such that there would be an effect on the nature conservation status of grass snake.

11.6.74 Given the above, the only potential pathway for an impact on the nature conservation status of grass snake would be as a consequence of killing or injury during site clearance works. This is addressed through the commitment for supervision of site clearance and relevant construction works by an ECoW (see the Impact Avoidance Measures detailed above in Section 11.5). With these embedded mitigation commitments, the potential for reptiles to be killed or injured will be negligible.

11.6.75 It is assessed that the Proposed Development would not adversely affect the nature conservation status of grass snake, so the effect is assessed as negligible (**not significant**). The proposed habitat enhancement measures and associated favourable management regimes (see the LBMEP, **Application Document Ref. 5.10**) are anticipated to improve habitat quality for grass snake, offsetting losses of poorer quality and/ or more regularly mown grassland habitats.

Breeding Birds

11.6.76 The construction of the Proposed Development is not likely to affect the nature conservation status of any species of breeding bird, given the limited habitat losses to the Proposed Development, the types of habitats affected and their relative suitability for use by breeding birds, and consideration of the bird species likely to use these habitats (refer to **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**)). In addition, the commitment to provide biodiversity enhancement under the terms of a LBMEP (**Application Document Ref. 5.10**) is considered sufficient to compensate for the minor permanent losses of nesting bird habitat (mainly improved grassland) resulting from construction of the Proposed Development.

11.6.77 The potential effect on breeding birds is assessed as negligible (**not significant**).

Fish

11.6.78 The relevant potential construction impacts relate to installation of a cofferdam within either the River Trent or the Stainforth and Keadby Canal, as described in **Chapter 5**: Construction Programme and Management (ES Volume I - **Application Document Ref. 6.2**). The fish species recorded from these watercourses and their ecological requirements are identified in **Appendix 11G** (ES Volume II - **Application Document Ref. 6.3**). Of these, the fish species requiring specific assessment are Atlantic salmon and European eel, on the basis that they are species of conservation concern. In addition, as migratory species, the location of the Proposed Development could adversely affect their ability to access habitats of high functional importance to these species.

11.6.79 The implications of construction activities for fish habitats has been assessed in relation to the watercourses concerned i.e. the River Trent and the Stainforth and Keadby Canal. As both of these watercourses are subject to nature conservation designations, this habitat assessment can be found within the impact assessment for these designations (paragraph 11.6.6 – 11.6.24 (River Trent) and 11.6.26 – 11.6.30 (Stainforth and Keadby Canal)) and is not repeated here. Instead, the purpose of this section is to assess the potential impact from installation of a cofferdam on individual fish species.

11.6.80 The only potential mechanisms for construction impact are through injury or mortality from underwater sound and vibration from piling for a cofferdam (if required), indirect barriers to movement from underwater sound and vibration during piling driving for construction of the cofferdam, and entrapment behind the cofferdam and associated dewatering.

11.6.81 Once any cofferdam is in place, it will not pose a barrier to fish movements along this section of river given that it would extend no more than 22m into the river channel from the western bank of the River Trent. This is a relatively

small distance in the context of a river channel that is circa 150m wide, so European eel and Atlantic salmon will still be able to move along the channel past the length of any cofferdam without impedance.

11.6.82 The basis for the required assessment of underwater sound and vibration on relevant fish species (species of conservation concern – Atlantic salmon and European eel) is **Appendix 11H**: Underwater Sound Effects on Fish (ES Volume II – **Application Document Ref. 6.3**). This also identifies relevant ameliorating factors related to restrictions on construction timings, methods (particularly restriction to core construction hours and 'soft start'), and the duration of and restrictions on the progression of piling should a cofferdam be required in the River Trent. The latter is committed mitigation captured in the Framework CEMP (**Application Document Ref. 7.1**). This detailed assessment concludes that there are no likely pathways for significant impacts on the conservation status of relevant fish species using the River Trent.

11.6.83 Potential underwater sound and vibration impacts on the only relevant fish species (European eel) likely to use the Stainforth and Keadby Canal are scoped out on the basis of the precedent established for comparable construction works for the consented Keadby 2 Power Station. It is reasonable to conclude that there is no likelihood of a significant effect on European eel within the canal given the works for Keadby 2 Power Station were acceptable. It is expected that the same regulatory restrictions/requirements would be applied to the Proposed Development in support of this conclusion.

11.6.84 Considering the potential for fish species to become trapped within the cofferdam structure at installation and be affected by dewatering. Again, this risk would be appropriately managed to deliver legislative compliance (see Section 11.5) so again an adverse effect on the nature conservation status of fish species is not likely. The required fish protection measures will be set out in a Fish Management Plan and this is a commitment within the Framework CEMP (**Application Document Ref. 7.1**).

11.6.85 Given these considerations, and while an impact on individual fish cannot be completely discounted, it is considered that piling is not likely to adversely affect the conservation status of fish species. Therefore, the potential construction effect is assessed as negligible (**not significant**).

Aquatic Invertebrates

11.6.86 Surveys for the Proposed Development have identified a single watercourse supporting a notable assemblage of aquatic invertebrates. This is Drain 1 (Glew Drain) on the northern boundary of the Main Site (see **Appendix 11G**, ES Volume II - **Application Document Ref. 6.3**) which supports an assemblage of aquatic invertebrates of county value. This drain would be directly affected by construction of a bridge crossing for the proposed

Emergency Vehicle Access Road (see **Figure 3.3** (ES Volume III - **Application Document Ref. 6.4** and **Application Document Ref. 4.16**)). The construction disturbance would be small-scale and temporary and is not likely to adversely affect the conservation status of the aquatic invertebrate assemblage associated with Drain 1.

11.6.87 The only other watercourses of potential aquatic invertebrate value and relevant to construction are Keadby Common Drain at Chapel Lane and a second section of Glew Drain. These drains are located on the alignment of proposed electrical connections. Given the small scale of the potential temporary impacts on these drains, they were scoped out for survey. They are likely to support assemblages comparable to similar sized waterbodies nearby (see **Appendix 11G** (ES Volume III - **Application Document Ref. 6.3**)). On a precautionary basis, it is assumed that these additional drain sections could also be of county value for aquatic invertebrates.

11.6.88 The above construction works are not likely to impact the nature conservation status of the aquatic invertebrate assemblages associated with the above drains. Worst-case construction requirements would affect no more than 10 - 15m stretches of drain bank and channel at each crossing location. The worst-case combined habitat loss on Glew Drain would be 30m from a drain that is at least 1.7km long (1.8%). Therefore, assuming a worst-case, greater than 98% of the Glew Drain would remain suitable to support the aquatic invertebrate assemblage. In comparison, worst case construction works on the Keadby Common Drain adjacent to Chapel Lane and Glew Drain would affect up to 3% of this 0.5km long section of drain, leaving 97% unaffected.

11.6.89 The localised and small-scale temporary construction impacts on aquatic invertebrates and their habitats is not considered likely to affect the nature conservation status of the relevant species and assemblages beyond the immediate footprint of the relevant construction works. So, the effect is assessed as negligible (**not significant**).

Invasive Non-native Species of Plants and Animals

11.6.90 There is limited potential for construction of the Proposed Development to cause the spread of plant and animal INNS. **Appendices 11C** and **11G** (ES Volume II - **Application Document Ref. 6.3**) identify a limited suite of relevant species as follows:

- Wall cotoneaster is present on adjacent land within the former Keadby Ash Tip and may be relevant at the time of construction if it colonises the Proposed Development Site prior to construction;
- New Zealand pigmyweed is present on the banks of the River Trent at the locations of the Proposed River Water Abstraction Option and the Proposed Water Discharge Corridor outfall. This species could be

disturbed during construction during any required upgrades to the existing water abstraction and/ or discharge structures at these locations;

- Nuttall's waterweed is present within the drain located on the northern boundary of the Main Site and could be disturbed during construction of a bridge for the proposed Emergency Vehicle Access Road where construction works are required within the channel of the drain; and
- Nuttall's waterweed, zebra mussel and demon shrimp are present within the Stainforth and Keadby Canal (**Appendix 11G** (ES Volume II - **Application Document Ref. 6.3**)) at the location of the proposed Canal Water Abstraction Option. These would be relevant if selected for the new cooling water intake to supply the Proposed Development.

11.6.91 There is potential for seeds/ propagules of the above relevant plant INNS (Nuttall's waterweed, New Zealand pigmyweed and wall cotoneaster) to be disturbed and transferred to new sites because of construction activities associated with the Proposed Development. For example, seeds/ propagules could be carried on vehicles, machinery and equipment to new locations within the Proposed Development Site or at distance from the Proposed Development.

11.6.92 Similar pathways for spread occur in relation to the aquatic animal INNS (zebra mussel and demon shrimp also). Larvae and/ or adults of these animal INNS could be transferred to new locations on vehicles, machinery and equipment if these are not thoroughly cleaned and/ or adequately drained and dried before movement to and use at another site.

11.6.93 It is not possible to assess the consequences of this for biodiversity as the scale of effect would depend on the INNS concerned, the number of seeds/ propagules/ animals dispersed, the ecology of the habitats affected, and the pre-existing status of the relevant INNS in these habitats. This is not considered material to this impact assessment, as it is primarily a matter for legal compliance. It is an offence to cause the named plant INNS to spread in the wild, so appropriate mitigation will be put in place to ensure legal compliance and these measures are adequate to address all relevant plant and animal INNS. Such mitigation is outlined in the Framework CEMP (**Application Document Ref. No. 7.1**) and the LBMEP (**Application Document Ref. No. 5.10**) that accompanies the DCO Application.

11.6.94 There is a requirement for mitigation to be applied effectively to provide legal compliance (see Section 11.5). On this basis, it is considered that propagules of INNS would not be spread beyond the immediate construction working area, and therefore there are no construction pathways likely to result in a significant adverse effect on biodiversity and nature conservation.

Operation

11.6.95 To enable a focussed impact assessment, an initial screening exercise has been completed (refer to **Appendix 11C** (ES Volume II - **Application Document Ref. 6.3**)) to determine which of the potential impacts during the operational phase are likely to result in effects on ecological features, following the implementation of development design and impact avoidance measures outlined in Section 11.5. These are taken forward in the impact assessment that follows. Those impacts that are considered unlikely to result in effects are scoped out and not considered further.

11.6.96 Potential impacts during the operational phase that could result in effects on ecological features are as follows:

- air quality impacts - air pollution from stack emissions, potentially leading to adverse effects on sensitive habitats, including nature conservation designations; and
- disturbance impacts - external operational lighting and noise has potential to affect bats where it coincides with their foraging and commuting habitats.

11.6.97 The potential impacts and resultant effects during the operational phase of the Proposed Development on those ecological features that have been scoped into the impact assessment are considered further below.

European Sites and National Nature Conservation Designations - emissions to air and water

11.6.98 The potential impacts and resultant effects relating to air emissions from the Proposed Development, in combination with background levels (which have been modified to include the future contribution from the Keadby 2 Power Station) on the identified relevant European Sites and national nature conservation designations are assessed in the operational air quality impact assessment provided as **Appendix 8B**: Air Quality Operational Phase (ES Volume II - **Application Document Ref. 6.3**).

11.6.99 The annual contribution of the Proposed Development to NO_x (in terms of the PC) is predicted to exceed 1% of the critical level at the Humber Estuary SAC and Ramsar site due to its close proximity to the Proposed Development, but not at any of the other European and nationally designated sites. However, the PEC (i.e. the existing baseline plus the Proposed Development emissions) is less than 70% of the critical level threshold for insignificance. Given this, the potential impact from NO_x is negligible and **not significant** at all European and national nature conservation sites.

11.6.100 For all other atmospheric pollutants (ammonia, nutrient nitrogen deposition and acid deposition), the 1% threshold for insignificance is not predicted to be exceeded at any European or nationally designated sites as a result of

the Proposed Development, so the effects are all also predicted to be negligible and **not significant**.

11.6.101 **Chapter 12:** Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**) and the related WFD Assessment (**Appendix 12B** (ES Volume II - **Application Document Ref. 6.3)** both assess the potential water quality impacts and effects on the relevant European Sites and national Humber Estuary nature conservation designations and their associated species and habitat features of interest. This includes assessment of the impacts of discharging treated cooling water to the River Trent (Water Discharge Corridor) and impacts associated with the potential River Water Abstraction Option from the River Trent, should abstraction from the Stainforth and Keadby Canal not be feasible. The assessment includes consideration of potential physico-chemical effects from residual biocides within the cooling water blowdown returned and thermal uplift affects due to the increased temperature of returned cooling water.

11.6.102 It is noted that the abstraction and discharge of cooling water will require a permit from the Environment Agency, which will control the volumes and rates of abstraction, and the effluent quality and rates of discharged waters considering the requirements to maintain the biodiversity and nature conservation status of the River Trent and the Humber Estuary designations, including WFD objectives. Cooling water will be monitored prior to discharge in compliance with the conditions of this permit. Given these controls, discharged water will not contain pollutants, including biocides used to treat zebra mussel, at concentrations which could give rise to significant environmental effects and no impacts on water availability or chemical water quality are predicted. As such, no adverse effects on the Humber Estuary nature conservation designations are predicted. The application of existing statutory regulatory regimes and permitting is sufficient to prevent this.

11.6.103 No other pathways are identified that could result in adverse operational impacts and effects on statutory nature conservation designations. The predicted effect on all European sites and statutory nature conservation designations is therefore negligible (**not significant**).

Non-Statutory Nature Conservation Designations - emissions to air and water abstractions

11.6.104 The potential impacts and resultant effects relating to air emissions on the identified relevant LWS within 2km of the Proposed Development are assessed in **Chapter 8B**: Air Quality Operational Phase (ES Volume II - **Application Document Ref. 6.3**). This air quality impact assessment indicates potential for an impact from nitrogen deposition at the Keadby Wetlands LWS. All other potential air quality impacts and effects are scoped out as in all cases the 1% threshold for insignificance is not predicted to be exceeded.

11.6.105 At the Keadby Wetland LWS, the predicted nitrogen dose is 0.17kgN/ha/yr (1.7% of the lower critical load) in the context of background deposition of 33.8kgN/ha/yr (modified to include the contribution from Keadby 2 Power Station). The background dose is already three times higher than the 10kgN/ha/yr critical load set for the most nitrogen sensitive habitats (wet woodland) potentially present. This assessment is likely to be overly precautionary, as the vegetation described on the citation indicates that the LWS supports closed scrub vegetation and a tall herb community typical of eutrophic wetland habitats. As such, further additions of nitrogen are not likely to be detrimental in this context. Regardless, reference to Natural England (2016) identifies that a highly precautionary (given the background deposition) minimum additional long-term dose of 0.4kgN/ha/yr would be required to alter the composition of the affected vegetation. The predicted PC of 0.17kgN/ha/yr is considerably below this and consequently the predicted effect is negligible (**not significant**).

11.6.106 The abstraction of cooling water (if required) from the Stainforth and Keadby Canal LWS will be undertaken in accordance with a water abstraction licence required from the Environment Agency, which will specify the volumes and rates of abstraction required to maintain the biodiversity and nature conservation status of the Stainforth and Keadby Canal LWS. **Chapter 12:** Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**) identifies no likely significant effects on the Stainforth and Keadby Canal LWS. Given this, no impacts on water availability or chemical water quality are likely and no adverse effects on the LWS are predicted. The application of existing statutory regulatory regimes and permitting is sufficient to prevent this.

11.6.107 No other pathways are identified that could result in adverse impacts and effects on non-statutory nature conservation designations.

Habitats - Acid Grassland Habitats and Open Mosaic Habitats on Previously Developed Land

11.6.108 The former Keadby Ash Tip contains 7.9ha of unimproved acid grassland habitat and 15.4ha of OMH, and these habitats are considered sensitive to potential effects of emissions to air from operation of the Main Site. These habitats have been assessed as having national value (see **Appendix 11C**, ES Volume II - **Application Document Ref. 6.3**).

11.6.109 Although not afforded any nature conservation designation, to ensure a conservative approach to assessment, the potential impacts and resultant effects relating to air emissions on these habitats has been assessed in **Chapter 8B**: Air Quality Operational Phase (ES Volume II - **Application Document Ref. 6.3**). In all cases, the 1% threshold for insignificance is not predicted to be exceeded, so the effects from NO_x, ammonia, nutrient nitrogen deposition and acid deposition are all anticipated to be negligible.

11.6.110 The predicted effect on these habitats of national nature conservation value is therefore negligible (**not significant**).

Species - Fish

11.6.111 No regular in-channel maintenance activities are anticipated as necessary at the water intake and outfall structures during operation, consistent with the current maintenance arrangements for the existing operational structures on the River Trent. Any future requirements for in-channel maintenance works (e.g. dredging/ desilting) would be subject to established statutory regulatory procedures and are not likely to result in significant effects on fish or other aquatic biodiversity. This assessment is in accordance with the conclusions of the Keadby 1 Power Station WFD Assessment Report (AECOM, 2015) prepared to meet the requirements of the MMO in relation to dredging operations at the locations of the existing water intake and outfall structures. Accordingly, as established and agreed previously with the MMO, maintenance activities are not likely to result in significant adverse effects on fish.

11.6.112 A WFD Assessment has been prepared for the Proposed Development and is included in **Appendix 12B** (ES Volume II - **Application Document Ref. 6.3**). This identifies and assesses the relevant watercourses for which it will be necessary to demonstrate no deterioration in any of the identified baseline classifications, and no prevention of future improvement for these classifications.

11.6.113 Similarly, as stated above in the assessment of operational impacts effects on nature conservation designations, it must be assumed that abstraction and discharge rates and volumes would be appropriate to maintain (as relevant) the physico-chemical and biological water quality of the River Trent and/ or the Stainforth and Keadby Canal. This is because abstraction and discharge would require a permit from the Environment Agency, with abstraction and discharge rates and quality required to demonstrate compliance with BAT for the watercourses concerned, and comparable to those already in operation at the Keadby 1 power station. Given this, water abstraction and discharge for the Proposed Development is not considered likely to have a significant effect on fish or their habitats.

11.6.114 The potential for fish entrainment and impingement will be controlled through the committed eel screen mesh sizes and water intake velocities agreed with the Environment Agency (the regulator) to protect all species of fish, including sensitive life stages of European eel and lamprey species. As such, this is a matter that does not require further assessment. The committed design measures combined with statutory regulatory regimes are considered appropriate to avoid significant adverse effects on fish from entrainment and impingement.

11.6.115 Biocides will be used to prevent the clogging of water supply pipework by aquatic organisms, including the INNS zebra mussel, and potential pathways for residual biocides to be discharged to the River Trent needs to be considered in relation to their potential to affect fish. It is considered that correct application of existing statutory regulatory regimes is sufficient to remove the potential impact pathway associated with the use of biocides, and consequently there would be no likely significant adverse effect on fish. Discharge of cooling water to the River Trent will require a permit from the Environment Agency, which will specify the effluent quality required, including consideration of biocides, to maintain the status of the receiving waters. Discharges will be similar or lower than those from the operational Keadby 1 power station. Cooling water will also be monitored prior to discharge to comply with the conditions of this permit. Discharged water will therefore not contain pollutants at levels likely to impact upon the chemical water quality of the River Trent.

11.6.116 The temperature of the cooling water discharge and its implications for the temperature of the River Trent is considered in **Chapter 12**: Water Environment and Flood Risk (ES Volume I - **Application Document Ref. 6.2**). As discharge would be via existing infrastructure, the cooling water will be mixed with cooling water from Keadby 2 Power Station, once operational, at source and therefore the predicted discharge temperature represents the worst-case in-combination scenario, recognising that Keadby 1 power station discharges would not occur at the same time as those from the Proposed Development.

11.6.117 As a worst-case, it is considered that a significant change in river water temperature from the addition of cooling water from the Proposed Development could have potential to impact both the existing WFD status of the River Trent, and achievement of the legally required good ecological status by 2027 and/ or impact fish through:

- thermal barriers from discharge of cooling water or impact on habitat suitability, including potential implications to fish migration; and
- changes in chemical status as a result of increased temperature, including concentration of dissolved oxygen.

11.6.118 Thermal impacts are not likely to have an adverse effect on the conservation status of fish using the River Trent catchment as the temperature of cooling water will be lower than that already associated with Keadby 1 Power Station, and the Proposed Development would not operate at the same time as any discharge from Keadby 1 Power Station but would use the existing Keadby 1 Power Station infrastructure. Further, prior modelling of the greater thermal discharge from Keadby 1 Power station concluded that there would be no impact to the overall status of fish populations (including consideration of lamprey, salmon, eels and coarse fish species) as a result of temperature-related mortality or thermal barriers to migratory fish movements. It was also

considered that this finding confirmed a previous conclusion reached by the Environment Agency that it is unlikely that thermal discharge of the level assessed would have any significant impact on the migration of river and sea lamprey between the river and the Humber Estuary (APEM, 2011).

11.6.119 In addition, it is noted that thermal regimes are another matter that is subject to regulatory regimes and permitting. Regardless of the reasonable conclusion presented above, existing statutory regulatory regimes will be applied to secure appropriate cooling water discharge temperatures suitable to maintain biological and chemical water quality.

11.6.120 Given the above, it is concluded that there are no impact pathways likely to result in an adverse operational effect on the conservation status of fish populations in either the River Trent or the Stainforth and Keadby Canal. The potential effect is therefore assessed as negligible (**not significant**).

Bats

11.6.121 Operation of the Proposed Development requires new external lighting at the location of the Proposed PCC Site. Operational lighting can be detrimental for bats if poorly designed and located in proximity to habitats of importance for bats e.g. important foraging habitats or movement corridors providing access to important foraging habitats. Light spill and glare can deter bats from accessing affected preferred habitats, and by so doing force bats to use habitats that are less suitable for foraging or expend more energy to go around the lit areas to access foraging habitats.

11.6.122 At the location of the Main Site, surveys in 2017 and 2020 recorded only very low levels of activity by common bat species (see **Appendix 11E**, ES Volume II - **Application Document Ref. 6.3**). The species recorded comprised those known to be more tolerant to artificial lighting. The low bat activity recorded is considered a function of the limited habitat quality at the Main Site when compared with the extensive availability of suitable habitats in the wider landscape.

11.6.123 As described in **Chapter 4**: Proposed Development (ES Volume I - **Application Document Ref. 6.2**), an Indicative Lighting Strategy accompanies the Application (**Application Document Ref. 5.11**), setting out how lighting impacts on sensitive ecological receptors, including those habitats used by bats, have been considered and addressed.

11.6.124 Given the existing very low levels of bat activity in association with the Main Site and the commitment to sensitive design of external artificial lighting, operation of the Proposed PCC Site is not likely to affect the conservation status of any bat species. The effect on bats from external lighting required for operation of the Proposed Development is assessed as negligible (**not significant**).

Terrestrial Invertebrates

11.6.125 Air quality impacts have been assessed in **Chapter 8:** Air Quality (ES Volume I - **Application Document Ref. 6.2**), where it is concluded that operation of the Proposed Development is not likely to have an adverse effect on the structure or function of habitats associated with the unimproved acid grassland and/ or OMH. Given this, there are no likely impacts and effects on the notable (national value) terrestrial invertebrate assemblage of the former Keadby Ash Tip that is dependent upon these habitats. The effect on terrestrial invertebrates from operation of the Proposed Development is therefore assessed as negligible (**not significant**).

Flora

11.6.126 Air quality impacts have been assessed in **Chapter 8:** Air Quality (ES Volume I - **Application Document Ref. 6.2**), where it is concluded that operation of the Proposed Development is not likely to have an adverse effect on the structure or function of habitats associated with the unimproved acid grassland and/ or OMH of national value. Given this, there are no likely impacts and effects on the notable (regional value) flora of the former Keadby Ash Tip that is dependent upon these habitats. The effect on flora from operation of the Proposed Development is therefore assessed as negligible (**not significant**).

Invasive Non-native Species of Plants and Animals

11.6.127 Operation of the Proposed Development is not considered likely to result in the spread of plant and animal INNS. The only likely potential pathway for such spread relates to aquatic INNS via the Potential Canal Water Abstraction Option from the Stainforth and Keadby Canal, which after operational use would then be routed to the existing Water Discharge Corridor outfall on the River Trent.

11.6.128 The potential for aquatic plant INNS (Nuttall's waterweed, see **Appendices 11C** and **11G**, ES Volume II - **Application Document Ref. 6.3**) to be drawn into the water supply via the Potential Canal Water Abstraction Option on the Stainforth and Keadby Canal will be managed due to the requirement for use of eel screens at the water intake in order to comply with The Eels (England and Wales) Regulations 2009 (as amended). Screens will provide an obstruction for these INNS at source.

11.6.129 In the unlikely event that aquatic plant INNS could survive passage through the water supply pipework to reach the River Trent, it is unlikely that this would pose a specific threat to the ecology of the River Trent downstream of the outfall structure. This is because these freshwater species will already be present in the River Trent, if in the unlikely event they can persist in brackish tidal waters, due to existing habitat connections and permeability via boat movements and Keadby Lock. Given the known wide distribution of Nuttall's

waterweed within the Trent catchment (Botanical Society of Britain and Ireland, 2021), there are also numerous existing upstream sources for the relevant plant INNS along the River Trent.

11.6.130 A similar rationale can be presented for the aquatic animal INNS (zebra mussel and demon shrimp, see **Appendix 11G** (ES Volume II - **Application Document Ref. 6.3**)) recorded from the Stainforth and Keadby Canal. The existing permeability of the water supply between the canal and the River Trent via Keadby Lock already permits the spread of these species into the River Trent, and this will be further facilitated by existing boat movements.

11.6.131 Irrespective of the existing pathways which may exist via watercourse connections, it is reasonable to assume that the application of routine precautionary measures, e.g. biocidal treatments of the water supply, will be applied to prevent the establishment of zebra mussel within the water supply pipework. Such measures are required to prevent zebra mussel from representing a significant constraint on operation of the Proposed Development, due to the potential for larvae to be drawn into the water supply (likely to be too small to be effectively screened out at source) and then settling and developing into adults within and blocking pipework. Application of such routine operational preventative maintenance measures will remove this potential pathway for spread.

11.6.132 No likely significant impacts and effects from plant and animal INNS are therefore anticipated as a result of operation of the Proposed Development.

Decommissioning

11.6.133 The potential for adverse decommissioning impacts and effects on relevant biodiversity and nature conservation features is limited by the nature of the proposed decommissioning activities. As described in **Chapter 4**: The Proposed Development (ES Volume I - **Application Document Ref. 6.2**), at the end of its operating life, it is anticipated that all above ground infrastructure would be removed to ground level, and hardstanding and sealed concrete areas will be left in place. Any areas of the Proposed Development that are below ground level will be backfilled to ground level to leave a levelled area and it is anticipated that buried pipelines will be capped and left in situ. Therefore, there will be no requirement to remove or disturb habitats to remove buried infrastructure, and no species associated with these habitats will be affected.

11.6.134 Requirements to remove above ground infrastructure means that decommissioning activities would be predominantly restricted to within the built footprint of the Proposed Development. Where vegetation is affected, it is most likely to be soft landscaping planted, or otherwise managed within the built layout of the Proposed PCC Site. Some of this vegetation could have established a biodiversity value that would need to be addressed and

managed appropriately during decommissioning in accordance with planning policy and legislation at that time.

11.6.135 As described in Section 11.5, decommissioning activities will be conducted in accordance with the appropriate guidance and legislation at the time of closure of the Proposed Development. A DEMP will be produced and agreed with the Environment Agency as part of the Environmental Permitting and site surrender process. The DEMP will consider in detail all potential environmental risks and contain guidance on how risks can be removed, mitigated or managed. Ecological surveys will be commissioned as appropriate to inform the scope of the DEMP. This is discussed further within **Chapter 4**: Proposed Development (ES Volume I - **Application Document Ref. 6.2**). The DEMP will be secured by a Requirement in the draft DCO (**Application Document Ref. 6.2**).

11.6.136 On this basis, no significant adverse effects are anticipated as a result of the decommissioning of the Proposed Development.

11.7 Mitigation, Monitoring and Enhancement Measures

Construction Mitigation

11.7.1 The assessment as presented herein indicates that the Proposed Development is not anticipated to generate any significant adverse effects during construction. Therefore, no measures additional to those as indicated in Section 11.5 are considered to be necessary.

11.7.2 Section 11.5 describes the embedded mitigation measures that would be undertaken to avoid adverse direct effects on habitats and species and to ensure legal compliance. These measures are incorporated into the Framework CEMP (**Application Document Ref. No. 7.1**) and are also carried over into the LBMEP (**Application Document Ref. 5.10**)), final versions of which will be secured by requirements in Schedule 2 of the draft DCO (**Application Document Ref. 2.1**). In summary, these include:

- A Water Vole Impact Avoidance Strategy will be prepared and agreed with relevant stakeholders to specify the measures and supervision required to deliver legislative compliance during construction of the Main Site and watercourse crossings.
- Typical construction risk management and avoidance measures for nesting birds.
- A Fish Management Plan will be prepared and agreed with relevant stakeholders to specify the measures and supervision required to deliver legislative compliance during installation and drawdown of any cofferdam used for the upgrade of the River Water Abstraction Option (if chosen) on the River Trent or the Canal Water Abstraction Option on the Stainforth

and Keadby Canal. This would also apply if relevant to replacement of the existing Mabey Bridge over the Hatfield Waste Drain LWS.

- Vegetation clearance and construction excavations have potential to affect wildlife and may result in offences under animal welfare legislation. An ECoW would be employed to supervise all relevant works to provide guidance on the measures required day-to-day to deliver legislative compliance.
- All excavations would be covered overnight, or where this is not practicable, a means of escape would be fitted e.g. battered soil slope or scaffold plank, to provide an escape route should any animals (e.g. reptiles, badger, otter, brown hare, hedgehog) stray into the construction site and fall into an excavation.
- A plant INNS survey will be undertaken prior to construction to determine the current location and extent of plant INNS, and to inform specification of the ISMP. If determined as necessary through this survey and after consideration of other available plant and animal INNS data, an ISMP will be prepared to accompany the final CEMP and would be agreed with relevant stakeholders. The ISMP would specify the measures and supervision necessary during construction to prevent the spread of plant and animal INNS to new locations.

Operation Mitigation

11.7.3 The measures adopted to control emissions of ammonia from the Proposed PCC Site are a form of mitigation (and have needed to be treated as such for the purposes of HRA (**Application Document Ref. No. 5.12**)). However, for the purposes of this EcIA this mitigation can be considered an embedded impact avoidance measure. Accordingly, it has already been taken into account within the preceding impact assessment and does not need to be considered further here.

11.7.4 Given the findings of the above impact assessment, no other mitigation measures are considered necessary during operation of the Proposed Development. Compliance with relevant permits (to be agreed with relevant regulators post-consent) and Requirements as set out in the draft DCO (**Application Document Ref. 2.1**) are considered appropriate to manage the potential for adverse environmental and ecological effects.

Decommissioning Mitigation

11.7.5 Any necessary mitigation requirements would be determined and agreed at a future date prior to decommissioning. As part of this process, the Applicant would provide a DEMP. Relevant habitat and protected species surveys would be undertaken to inform the specification of relevant working methods and mitigation in the DEMP. This is discussed further within **Chapter 4**: Proposed Development (ES Volume I - **Application Document Ref. 6.2**)

Enhancement

11.7.6 A standalone Landscape and Biodiversity Management and Enhancement Plan (LBMEP) is provided as **Application Document Ref. 5.10** of the DCO Application. This sets out biodiversity enhancement proposals and the habitat management and monitoring proposed to deliver these. It also confirms that the proposed enhancement measures are suitable to achieve no net loss and a net gain in biodiversity within the Proposed Development Site. It is proposed that submission and approval of the final LBMEP will be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**).

11.7.7 The biodiversity enhancement measures proposed comprise:

- creation of flower-rich native grassland;
- new species-rich native hedgerow plantings;
- enhancement of field drains for water voles and other aquatic biodiversity; and
- installation of nest boxes for barn owl and other birds, habitat creation for willow tit, and installation of roosting boxes for bats.

11.7.8 The proposed new grassland creation includes areas directly connected to habitat corridors designated as Stainforth and Keadby Canal Corridor LWS and Hatfield Waste Drain LWS. The proposed new grassland therefore complements and enhances these LWS.

11.7.9 It is demonstrated in the LBMEP that the above measures are suitable to achieve a gain for biodiversity in accordance with relevant planning policy.

Monitoring

11.7.10 The measures proposed to avoid and reduce, where possible, significant adverse effects on biodiversity and nature conservation features are set out above. Monitoring requirements to track compliance with these commitments during the construction phase will be set out in the final CEMP. In particular, an ECoW would be employed to oversee the delivery of all necessary mitigation, including any mitigation to be completed under relevant species mitigation licences.

11.7.11 Habitat monitoring may also be needed for a defined period during operation to measure and confirm successful establishment and management of the committed measures. The need for such monitoring will depend on the final selection of construction locations and methods, and therefore this will be detailed in the final LBMEP which will be agreed during discharge of the relevant Requirement in the DCO (**Application Document Ref. 2.1**).

11.7.12 The anticipated requirements for post-construction monitoring of the establishment of landscape and biodiversity enhancement measures are set out in the LBMEP (**Application Document Ref. 5.10**).

11.8 Limitations or Difficulties

11.8.1 Baseline conditions and relevant biodiversity and nature conservation features have been determined using appropriate methods in accordance with the approach agreed during scoping and subsequent engagement with stakeholders.

11.8.2 Where surveys have not been possible at the time of preparation of the EcIA, then an appropriate precautionary (worst-case) assessment has been made with reference to the data available at the time of assessment. The only example of the latter circumstance is the omission of a water vole survey of Glew Drain where there may be a need to install a crossing for the 132kV Electrical Connection option. In this instance, the species is assumed to be present as minor evidence (one latrine) was found during unpublished pre-construction surveys for Keadby 2 Power Station in 2020. Therefore, reasonable assumptions are made on the potential impacts and effects.

11.8.3 All habitats and species have been valued in accordance with the precautionary principle, i.e. the maximum likely nature conservation value has been applied based on the information available to inform decision-making on this.

11.8.4 For the purposes of worst-case assessment and pending further information on the layout of the Proposed PCC Site and temporary construction laydown areas, it has been assumed that all semi-natural habitats present within the Main Site would be lost during construction. Unless stated otherwise, elsewhere within the Proposed Development Site, it is assumed that only temporary ground disturbances will be required, e.g. for laying of pipelines and cables, followed by appropriate reinstatement of affected areas of vegetation.

11.9 Summary of Likely Significant Residual Effects

11.9.1 The Proposed Development has been sensitively designed and positioned with reference to the existing baseline conditions and potential pathways for impact. As a consequence, no significant adverse residual construction, operation or decommissioning effects are anticipated as a result of construction of the Proposed Development.

11.9.2 Proposals suitable to achieve benefits for biodiversity as a direct consequence of the Proposed Development are described and demonstrated within the Landscape and Biodiversity Management and Enhancement Plan submitted with the Application (**Application Document Ref. 5.10**).

11.10 References

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