

# The Keadby 3 Low Carbon Gas Power Station Project

**PINS Ref: EN010114**

**The Keadby 3 (Carbon Capture Equipped Gas Fired Generating Station) Order**

**Land at and in the vicinity of the Keadby Power Station site, Trentside, Keadby, North Lincolnshire**

## Environmental Statement (ES) Non-Technical Summary

**The Infrastructure Planning (Applications: Prescribed Forms and Procedure Regulations 2009 - Regulation 5(2)(a) The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017**

**Applicant: Keadby Generation Limited**

**Date: May 2021**

## DOCUMENT HISTORY

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## GLOSSARY

<b>Abbreviation</b>	<b>Description</b>
AEP	Annual Exceedance Probability - in relation to flooding, the 100-year flood (a flood likely to occur once every 100 years) can be expressed as the 1% AEP flood, which has a 1% chance of being exceeded in any year.
AGI	Above Ground Installation - installations used to connect gas pipelines to supply infrastructure; above ground installations are needed at the start and end of a pipeline and potentially at intervals along the route.
AIL	Abnormal Indivisible Load - a load that cannot be broken down into smaller loads for transport without undue expense or risk of damage. It may also be a load that exceeds certain parameters for weight, length and width.
ALARP	As Low as Reasonably Practicable - a term often used in the regulation and management of safety-critical and safety-involved systems. The ALARP principle is that the residual risk shall be reduced as far as reasonably practicable.
AOD	Above Ordnance Datum - a spot height (an exact point on a map) with an elevation recorded beside it that represents its height above a given datum.
AQMA	Air Quality Management Area - an area designated by the local authority to be managed, through the implementation of a Local Air Quality Management Area, to ensure that it meets national air quality objectives.
AQS	Air Quality Objectives - the target date on which exceedances of an air quality standard must not exceed a specified number.
BGL	Below Ground Level – groundwater level.
BGS	British Geological Survey - provider of objective and authoritative geoscientific data, information and knowledge for the UK.
CAMS	Catchment Abstraction Management Strategy - assess the amount of water available in each river catchment.
CCGT	Combined Cycle Gas Turbine - a highly efficient form of energy generation technology. A gas turbine burns gas to drive a turbine to

Abbreviation	Description
	generate electricity. Surplus heat from the turbine is used to generate steam that is used to generate further electricity.
CCP	Carbon Capture Plant – plant used to capture carbon dioxide (CO <sub>2</sub> ) emissions produced from the use of fossil fuels in electricity generation and industrial processes.
CCR	Carbon Capture Resilience - the resilience of a development to projections for climate change, including how the development design would be adapted to take account for the projected impacts of climate change.
CCR	Carbon Capture Readiness – a power station is Carbon Capture Ready where it has been demonstrated that: sufficient space is available on or near the site to accommodate carbon capture equipment in the future; retrofitting carbon capture technology is technically feasible; that a suitable area of deep geological storage exists for the storage of captured CO <sub>2</sub> ; transporting CO <sub>2</sub> to the storage location is technically feasible and carbon capture and storage is likely to be economically feasible.
CCUS	Carbon Capture, Usage and Storage – a group of technologies designed to reduce the amount of carbon dioxide (CO <sub>2</sub> ) released into the atmosphere from coal and gas power stations as well as heavy industry including cement and steel production. Once captured, the CO <sub>2</sub> can be either re-used in various products, such as cement or plastics (utilisation), or stored in geological formations deep underground (storage).
CO	Carbon Monoxide - a colourless, odourless and tasteless gas slightly less dense than air.
CO <sub>2</sub>	Carbon Dioxide - an inorganic chemical compound with a wide range of commercial uses.
CWTP	Construction Workers' Travel Plan – a plan managing and promoting how construction workers travel to a particular area or organisation. It aims at promoting greener, cleaner travel choices and reducing reliance on the private car.
DCO	Development Consent Order - made by the relevant Secretary of State pursuant to The Planning Act 2008 to authorise a Nationally Significant Infrastructure Project. A DCO can incorporate or remove the need for a range of consents which would otherwise be required for a development. A DCO can also include rights of compulsory acquisition.
EA	Environment Agency - a non-departmental public body sponsored by the United Kingdom government's Department for Environment, Food and Rural Affairs (DEFRA), with responsibilities relating to the protection and enhancement of the environment in England.

<b>Abbreviation</b>	<b>Description</b>
EIA	Environmental Impact Assessment - a term used for the assessment of environmental consequences (positive or negative) of a plan, policy, programme or project prior to the decision to move forward with the proposed action.
ELV	Emission Limit Value - emission limit values based on the Best Available Techniques.
ES	Environmental Statement - a report in which the process and results of an Environment Impact Assessment are documented.
FRA	Flood Risk Assessment - an assessment of the flood risk from all sources of flooding for a development
GHG	Greenhouse Gases - atmospheric gases such as carbon dioxide, methane, chlorofluorocarbons, nitrous oxide, ozone, and water vapour that absorb and emit infrared radiation emitted by the Earth's surface, the atmosphere, and clouds.
HE	Historic England - an executive non-departmental body of the British Government tasked with protecting the historical environment of England.
HER	Historic Environment Record - information services that provide access to comprehensive and dynamic resources relating to the archaeology and historic built environment of a defined geographic area.
HGV	Heavy Goods Vehicle - vehicles with a gross weight in excess of 3.5 tonnes.
HRSG	Heat Recovery Steam Generator - an energy recovery heat exchanger that recovers heat from a hot gas stream. It produces steam that can be used in a process (cogeneration) or used to drive a steam turbine (combined cycle).
HRA	Habitats Regulations Assessment - the assessment of the impacts of implementing a plan or policy on a Natura 2000 site required under the Habitats Directive.
ICCI	In-Combination Climate Change Impact - the in-combination effects of a changing climate.
IED	Industrial Emissions Directive – European Union Directive 2010/75/EU, committing member states to control and reduce the impact of industrial emissions on the environment.
INNS	Invasive Non-native Species - species that have occurred outside of their natural range. Invasive species have the potential to hinder or prevent survival of others within the ecosystem.
kV	Kilovolt - unit of electrical potential. There are 1,000 volts in a kilovolt.
LBMEP	Landscaping and Biodiversity Management and Enhancement Plan

<b>Abbreviation</b>	<b>Description</b>
LCA	Landscape Character Area - areas of homogenous landscape or townscape character. Typical components defining character include landform, land cover, settlement pattern, form, and enclosure.
LWS	Local Wildlife Site - defined areas, identified and selected for their nature conservation value, based on important, distinctive and threatened habitats and species with a national, region.
MA&D	Major Accidents and Disasters - the potentially significant effects of a development.
MPS	Marine Policy Statements - the framework for preparing Marine Plans and taking decisions affecting the marine environment.
MW	Megawatt - unit of power.
NCA	National Character Area - a natural subdivision of England based on a combination of landscape, biodiversity, geodiversity and economic activity.
NGR	National Grid Reference - system of geographical grid references.
NIA	Nature Improvement Area - established to create joined up and resilient ecological networks at a landscape scale.
NIC	National Infrastructure Commission - established in 2015 to provide independent, impartial advice on the UK's long-term infrastructure needs.
NIP	National Infrastructure Plan - shows the government's progress on delivery and sets out its long-term plans for UK infrastructure.
NLC	North Lincolnshire Council
NPPF	National Planning Policy Framework - The NPPF came into effect on 27 March 2012 (with some transitional arrangements), replacing the majority of national planning policy other than NPSs. The NPPF is part of the Government's reform of the planning system intended to make it less complex, to protect the environment and to promote sustainable growth. It does not contain any specific policies on Nationally Significant Infrastructure Projects but its policies may be taken into account in decisions on DCOs if the Secretary of State considers them to be both important and relevant.
NPS	National Policy Statement - Statements produced by Government under the Planning Act 2008 providing the policy framework for Nationally Significant Infrastructure Projects. They include the Government's view of the need for and objectives for the development of Nationally Significant Infrastructure Projects in a particular sector such as energy and are used to determine applications for such development.
NRMM	Non-Road Mobile Machinery - machinery typically used off the road, such as construction machinery.

Abbreviation	Description
NSIP	Nationally Significant Infrastructure Project - defined by the Planning Act 2008 and cover projects relating to energy (including generating stations, electric lines and pipelines); transport (including trunk roads and motorways, airports, harbour facilities, railways and rail freight interchanges); water (dams and reservoirs, and the transfer of water resources); wastewater treatment plants and hazardous waste facilities. These projects are only defined as nationally significant if they satisfy a statutory threshold in terms of their scale or effect.
NSR	Noise Sensitive Receptor - locations or areas where dwelling units or other fixed, developed sites of frequent human use occur which may be sensitive to noise impacts.
NTS	Non-Technical Summary - a summary of the Environmental Statement written in non-technical language for ease of understanding.
OS	Ordnance Survey - the national mapping agency for Great Britain.
PEA	Preliminary Ecological Appraisal - an ecological assessment method which evaluates the existing ecological value of a site.
PEIR	Preliminary Environmental Impact Report – an initial statement of the main environmental information available for a study area.
Photomontage/ photowires	Inserting an image of a proposed development onto a photograph for the purposes of creating an illustrative representation of potential changes to existing views.
PINS	Planning Inspectorate – executive agency of the Ministry of Housing, Communities and Local Government of the UK Government. It is responsible for determining final outcomes of town planning.
Planning Act 2008	An Act of Parliament in the UK intended to speed up the process of approving major new infrastructure projects.
Keadby Power Station Site	The existing Keadby Power Station site, comprising the land owned by the Applicant.
PRoW	Public Right of Way - a highway where the public has the right to walk. It can be a footpath (used for walking), a bridleway (used for walking, riding a horse and cycling), or a byway that is open to all traffic (including motor vehicles).
Ramsar	Wetland sites that are of international importance, as designated under Article 2(1) of the Convention on Wetlands of International Importance.
Receptor	A defined individual environmental feature usually associated with population, fauna and flora that has potential to be affected by a project.

<b>Abbreviation</b>	<b>Description</b>
Residual Effect	The predicted consequential change on the environment from the impacts of a development after mitigation.
Resource	A defined and generally collective environmental feature usually associated with soil, water, air, climatic factors, landscape, material assets, including the architectural and archaeological heritage that has potential to be affected by a project.
Rochdale Envelope	An approach to consenting and environmental impact assessment, (EIA) named after a UK planning law case, which allows the promoters of development projects to broadly define their schemes within agreed parameters to retain flexibility of design.
SAC	Special Area of Conservation – high quality conservation sites that are protected under the European Union Habitats Directive, due to their contribution to conserving those habitat types that are considered to be most in need of conservation.
Scoping	The process of identifying the issues to be addressed by the Environmental Impact Assessment process. It is a method of ensuring that an assessment focuses on the important issues and avoids those that are considered to be not significant.
Scoping Opinion	The written opinion of the relevant authority, following a request from the applicant, as to the information to be provided in an Environmental Statement.
Scoping Report	A report which records the outcomes of the scoping process and is typically submitted as part of a formal request for a Scoping Opinion.
SCR	Selective Catalytic Reduction – the removal of nitrogen oxides from the flue gas.
Secondary Aquifer	There are two types of secondary aquifer designations: Secondary A: permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers; and Secondary B: predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
SM	Scheduled Monument – an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. Scheduled monuments are protected by the Ancient Monuments and Archaeological Areas Act 1979.

<b>Abbreviation</b>	<b>Description</b>
SOAEL	Significant Observed Adverse Effect Level – the level above which significant adverse effects on health and quality of life occur.
SoS	The Secretary of State – the decision maker for DCO applications and head of Government department. In this case, the SoS for the Department for Business, Energy and Industrial Strategy (formerly the Department for Energy and Climate Change).
SPZ	Source Protection Zone - zones defined by the Environment Agency to protect groundwater sources such as wells, boreholes and springs from potential contamination.
SSSI	Site of Special Scientific Interest - nationally designated Sites of Special Scientific Interest, an area designated for protection under the Wildlife and Countryside Act 1981 (as amended), due to its value as a wildlife and/or geological site.
Stakeholder	An organisation or individual with a particular interest in a development project.
Study area	The area within which environmental effects which may be classed as significant are assessed (i.e. extending a distance from the project footprint).
SWMP	Site Waste Management Plan – a plan setting out how resources will be managed and waste controlled at all stages during a construction project.
TTWA	Travel to Work Area – statistical tool used by UK Government agencies and local authorities to indicate an area where the population would generally commute to a larger town or city for employment purposes.
Visual Amenity	The enjoyment or benefit that people (individually or as a group) gain from a particular view that may change as a consequence of a proposed development during its construction, operation or decommissioning.
WFD	Water Framework Directive – European Union directive which commits member states to achieve good qualitative and quantitative status of all water bodies.
Worst-case assumption (or scenario)	An assumption adopted within an environmental impact assessment which identifies a scenario or parameter that would likely result in the maximum environmental effect (termed the worst-case). This is typically applied where uncertainty exists over the detail of a particular development component or approach to project delivery, for which a basis of assessment is needed.
WSI	Written Scheme of Investigation – documents which set out the approach to undertaking archaeological monitoring of ground investigation works.



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<b>Abbreviation</b>	<b>Description</b>
ZTV	Zone of Theoretical Visibility – a computer generated tool to identify the likely (or theoretical) extent of visibility of a development.

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## 1.0 NON-TECHNICAL SUMMARY

### 1.1 Introduction

1.1.1 This document presents a Non-Technical Summary (NTS) of the Environmental Statement (ES) that has been prepared to accompany the Development Consent Order (DCO) Application by Keadby Generation Limited ('the Applicant') for a new low carbon power station within Keadby Power Station, near Scunthorpe, Lincolnshire. In this NTS, and throughout the ES, this is referred to as the 'Proposed Development'.

1.1.2 A DCO is required for the Proposed Development as it falls within the definition and thresholds for a 'Nationally Significant Infrastructure Project' (an 'NSIP'). The Applicant has therefore submitted an application to the Secretary of State (for Business, Energy and Industrial Strategy) under Section 37 of the Planning Act 2008 (the 2008 Act), seeking a DCO for the Proposed Development. If granted by the Secretary of State, the DCO will provide the necessary authorisations and consents for the construction, operation and maintenance of the Proposed Development.

1.1.3 The Proposed Development will be a Combined Cycle Gas Turbine (CCGT) power station like Keadby 1 and Keadby

2 Power Station but will also be fitted with 'First of a Kind' in the UK carbon capture plant (CCP) technology. This will capture around 2 million tonnes of carbon dioxide (CO<sub>2</sub>) emissions per annum, that would otherwise be emitted; equivalent to the annual energy use of over half a million homes in the UK. The Applicant would not build the CCGT without the CCP as the Applicant is committed to building a generating station which has a clear route to decarbonisation. The Proposed Development will therefore make a significant contribution towards the UK reaching its Net Zero greenhouse gas emissions target by 2050.

1.1.4 It is intended that the Proposed Development will connect to the Humber Low Carbon Pipeline infrastructure to be delivered by National Grid Carbon as part of the Zero Carbon Humber (ZCH) Partnership<sup>1</sup>. This pipeline will connect the Proposed Development and other emitters in the Humber region as shown on **Figure NTS1** and transport carbon dioxide for offshore geological storage by the Northern Endurance Partnership (NEP)<sup>2</sup>. These elements do not form part of this Application but are being progressed by third parties.

1.1.5 All of the land included within the DCO boundary (or 'Order Limits') is referred to as 'the Proposed Development Site'

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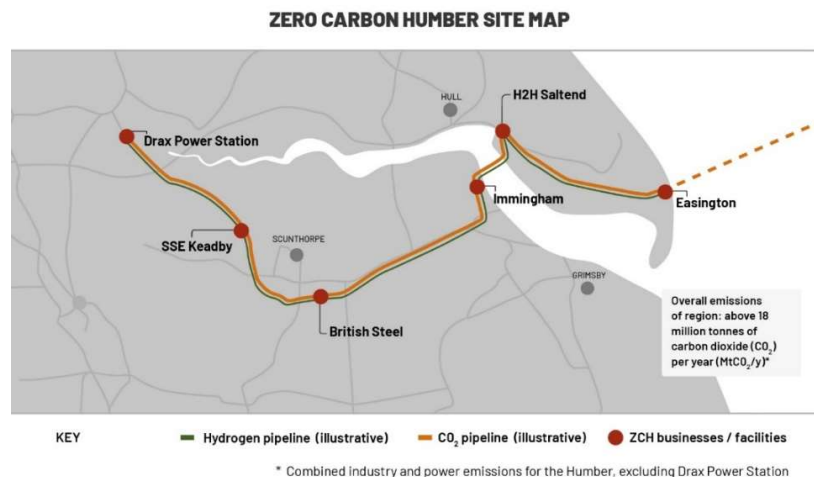
<sup>1</sup> <https://www.zerocarbonhumber.co.uk/the-vision/>

<sup>2</sup> <https://www.zerocarbonhumber.co.uk/news/northern-endurance-partnership/>

for the purposes of the ES and this NTS and is described in Sections 3.0 and 4.0 of this NTS.

- 1.1.6 This document provides a summary of the ES which has been prepared to accompany the DCO in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (‘the EIA Regulations’). The purpose of this NTS is to describe the Proposed Development and provide an overview of the key findings of the ES.

**Figure NTS1: Zero Carbon Humber Site Map**



## 1.2 The Applicant

- 1.2.1 The Applicant, Keadby Generation Limited, is the freehold owner of a large part of the Proposed Development Site and is a wholly owned subsidiary of the FTSE-listed SSE plc, one of the UK’s largest and broadest-based energy companies, and the country’s leading developer of renewable energy generation. Over the last 20 years, SSE plc has invested over £20bn to deliver industry-leading offshore wind, onshore wind, CCGT, energy from-waste, biomass, energy networks and gas storage projects. The Applicant owns and operates the adjacent Keadby 1 Power Station and is in the process of constructing Keadby 2 Power Station. SSE operates the Keadby Windfarm which lies to the north and south of the Proposed Development Site and generates renewable energy from 34 turbines, with a total installed generation capacity of 68MW.

- 1.2.2 SSE has produced a ‘Greenprint’ document (SSE, 2020) that sets out a clear commitment to investment in low carbon power infrastructure, working with government and other stakeholders to create a Net Zero power system by 2040. This includes investment in flexible sources of electricity generation and storage for times of low renewable output which will complement other renewable generating sources, using low-carbon fuels and/ or capturing and storing carbon emissions. SSE is working with leading organisations across the UK to accelerate the development of carbon capture, usage and storage

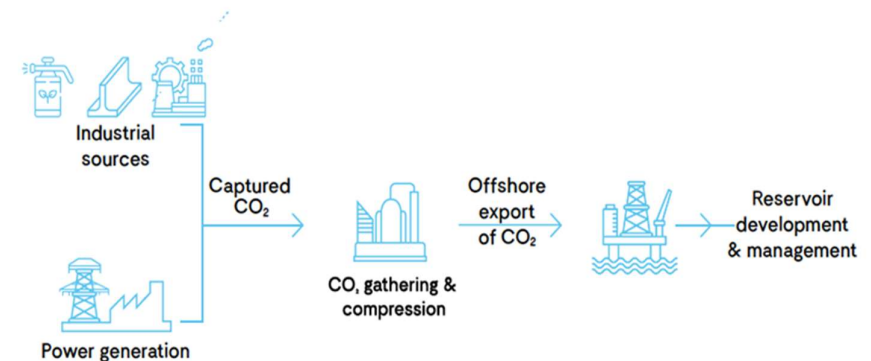
(‘CCUS’) clusters, including Equinor and National Grid Carbon.

- 1.2.3 The design of the Proposed Development demonstrates this commitment. The Proposed Development will be built with a clear route to decarbonisation, being equipped with post-combustion carbon capture technology, consistent with SSE’s commitment to reduce the carbon intensity of electricity generated by 60% by 2030, compared to 2018 levels.

### 1.3 What is Carbon Capture, Usage and Storage?

- 1.3.1 CCUS is a process that removes carbon dioxide emissions at source, for example emissions from a power station or industrial installation, and then compresses the carbon dioxide so that it can be safely transported to secure underground geological storage sites. It is then injected into layers of solid rock filled with interconnected pores where the carbon dioxide becomes trapped and locked in place, preventing it from being released into the atmosphere. CCUS is crucial to reducing carbon dioxide emissions - the UK Government has committed to achieving Net Zero in terms of greenhouse gas emissions by 2050. **Figure NTS2** shows what is involved in the process.

**Figure NTS2: Illustration of the Carbon Capture, Usage and Storage (CCUS)**



## 2.0 ASSESSMENT METHODOLOGY

### 2.1 Environmental Impact Assessment Methodology

- 2.1.1 An EIA is an environmental assessment process to ensure that consenting decisions are made with knowledge of the likely significant effects of a future development. The EIA process presented in the ES (Volume I - III) follows a standard EIA methodology, described here.
- 2.1.2 EIA is undertaken to help to anticipate changes (or 'impacts') that may occur to the environment as a result of the Proposed Development and assesses key stages in the construction and operation (including maintenance and use) and where possible and relevant, decommissioning of developments. The changes are compared to the environmental conditions that would have occurred without the Proposed Development ('the baseline conditions').
- 2.1.3 The EIA process identifies potentially sensitive 'receptors' that may be affected by these changes (e.g. people living near the development, local flora and fauna) and assesses the extent to which these receptors may be affected by the predicted changes and whether or not the receptors are likely to experience a 'significant effect'.
- 2.1.4 Where possible, the EIA uses standard methodologies, based on legislation, defined standards and accepted industry criteria. This is set out in detail in each technical chapter of the ES (Volume I – **Application Document Ref. 6.2**). Effects on receptors can be adverse (negative),

neutral (neither negative, nor positive) or beneficial (positive). They can also be temporary (e.g. noise during construction) or permanent (e.g. the views of the finished buildings).

- 2.1.5 For the purpose of the ES, adverse and beneficial effects are described as 'significant' or 'not significant'. Where the EIA predicts a significant adverse effect on one or more receptors, mitigation measures are identified where possible to avoid or minimise the effect, or to reduce the likelihood of the effect happening. The use of such mitigation is proposed to be secured through Requirements (similar to planning conditions) included within the draft DCO (**Application Document Ref. 2.1**) or through other legislation and consenting regimes. Details of the EIA Methodology is provided within **Chapter 2: Assessment Methodology** (ES Volume I - **Application Document Ref. 6.2**).
- 2.1.6 In general, the classification of an effect is based on the magnitude (scale) of the impact and sensitivity or value/importance of the receptor, using the matrix shown in **Table 1**. Moderate and major effects are considered to be 'significant' for the purposes of the EIA Regulations in accordance with standard EIA practice.

**Table 1: Classification of effects**

Magnitude of Impact	Sensitivity/Importance of Receptor			
	High	Medium	Low	Very Low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

## 2.2 EIA Scoping

- 2.2.1 EIA Scoping is a process that is designed to identify relevant topics that should be included in the EIA and reported in the ES. An EIA Scoping Report and a request for an EIA Scoping Opinion, under Regulation 10 of the EIA Regulations, was submitted to the Planning Inspectorate (PINS) and relevant consultees on 15 May 2020 to allow them to comment on the extent and approach to the environmental assessments to be undertaken.
- 2.2.2 A Scoping Opinion was received from the Planning Inspectorate on 26 June 2020 and is presented within **Appendix 1B: Scoping Opinion (ES Volume II – Application Document Ref. 6.3)**. The ES is based on the

Scoping Opinion and therefore includes assessments of the following environmental topics:

- **Chapter 8:** Air Quality;
- **Chapter 9:** Noise and Vibration;
- **Chapter 10:** Traffic and Transport;
- **Chapter 11:** Biodiversity and Nature Conservation;
- **Chapter 12:** Water Environment and Flood Risk;
- **Chapter 13:** Geology, Hydrogeology and Land Contamination;
- **Chapter 14:** Landscape and Visual Amenity;
- **Chapter 15:** Cultural Heritage;
- **Chapter 16:** Socio-economics;
- **Chapter 17:** Climate Change and Sustainability;
- **Chapter 18:** Major Accidents and Disasters; and
- **Chapter 19:** Cumulative and Combined Effects.

2.2.3 Following the completion of an EIA Scoping Report and publication of a Scoping Opinion, the environmental information for a DCO is reported in two stages.

- a Preliminary Environmental Information (PEI) Report is prepared to inform statutory (formal) consultation with the public and other stakeholders about the Proposed Development, based on the preliminary



environmental information available at the time of consultation; and

- an ES, which is then prepared to accompany the DCO application and includes the EIA of the Proposed Development, taking account of any design evolution that has taken place, as well as feedback received during consultation.

2.2.4 The PEI Report was prepared to meet the requirements of Regulation 12(2) of the EIA Regulations and was published in November 2020. In order to enable consultees to understand the likely environmental effects of the Proposed Development, the PEI Report presented preliminary findings of the environmental assessments undertaken up to that point in time. This allowed consultees the opportunity to provide informed comments on the Proposed Development, the assessment process and preliminary findings, prior to the finalisation of the ES.

2.2.5 Regulation 14(2) describes the requirements of an ES, which includes a description of the Proposed Development, its likely environmental effects, measures to avoid, prevent, reduce and offset likely significant adverse effects, a description of alternatives and reasons for the options chosen, and a NTS of the information. This document is the NTS of the ES submitted with the DCO Application.

## 2.3 Consultation

2.3.1 Consultation is important in the preparation of DCO Applications and in the EIA process. The 2008 Act requires applicants for development consent to carry out pre-application consultation on their proposals. This includes consultation on the PEI Report, as described above.

2.3.2 Consultation with key stakeholders has been ongoing throughout the EIA process and on publication of the PEI Report, and comments raised have been addressed in the ES, where applicable.

2.3.3 All the consultation responses received have been considered in the preparation of the Application and supporting documentation, as set out in the Consultation Report (**Application Document Ref. 5.1**) that also accompanies the DCO Application.

## 2.4 Environment Statement

2.4.1 The format of the ES is outlined in **Table 2**.

**Table 2: ES Contents**

ES Volume	Content
Volume I	Chapters 1 - 2 present an introduction to the project and EIA assessment methodology. Chapters 3 - 6 present a description of the Proposed Development Site and

ES Volume	Content
	<p>surrounding areas; components of the Proposed Development, their construction and decommissioning, programme and alternatives.</p> <p>Chapter 7 presents a summary of relevant legislation and planning policy.</p> <p>Chapters 8 – 18 present the findings of the environmental assessments, likely significant effects identified, and mitigation, monitoring and enhancement measures proposed.</p> <p>Chapter 19 provides an assessment of the potential for cumulative and combined effects to occur as a result of the Proposed Development.</p> <p>Chapter 20 provides a summary of the likely significant residual environmental effects identified.</p>
2 - Appendices	Presents additional information to support the environmental assessments in Volume I.
3 - Figures	Presents figures that accompany ES Volume I and II.

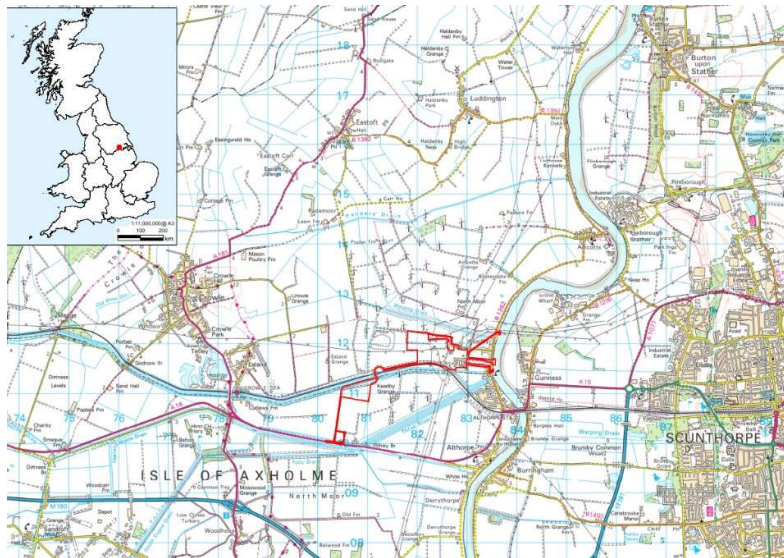
ES Volume	Content
4 – Non-Technical Summary	A stand-alone summary of the ES volumes listed below in non-technical language.

## 3.0 DESCRIPTION OF EXISTING ENVIRONMENT

### 3.1 The Site and Surroundings

3.1.1 The Proposed Development Site is located within and near to the existing Keadby Power Station site near Scunthorpe, Lincolnshire, as shown on **Figure NTS3**, and is centred on national grid reference 482351, 411796.

**Figure NTS3: Proposed Development Site Location Plan**



3.1.2 The Keadby Power Station site includes the operational Keadby 1 Power Station and Keadby 2 Power Station

(under construction). It falls within the administrative area of North Lincolnshire Council (NLC).

3.1.3 Beyond the current Keadby Power Station site, land use is almost entirely low lying farmland and scattered villages, however, the immediate site surroundings have been developed in recent years with power related infrastructure, including the operational Keadby Windfarm to the north and south of the Proposed Development Site and the pylons associated with the existing National Grid 400kV Substation located within the Proposed Development Site.

### 3.2 Parts of the Proposed Development Site

3.2.1 The Proposed Development Site covers an area of approximately 69.4 hectares (ha),. Many components together make up the Proposed Development Site as shown in **Figure NTS4**, and for the purposes of the ES, the following names (described in Section 4.0 of this NTS) are used to describe parts of the Proposed Development Site:

- The Proposed Power and Carbon Capture site (Proposed PCC Site) which includes an area referred to as the 'Main Site';
- Electrical Connection Area to National Grid 400 kilovolt (kV) Substation;
- Potential Electrical Connection from Northern Powergrid Substation;

- Emergency Vehicle Access Road;
  - Land within the Keadby Power Station site for the purposes of facilitating connections to the Proposed Development for natural gas supply (Gas Connection Area), and other necessary infrastructure (including 'Water Connection Corridor');
  - Water Connection Corridors including River Water Abstraction Option and Canal Water Abstraction Option and Water Discharge Corridor;
  - Waterborne Transport Offloading Area;
  - Additional Abnormal Indivisible Load (AIL) Route;
  - Construction Laydown Areas;
  - Construction and Operational Vehicular Site Access Route and Gatehouse;
  - A18 Junction Improvement and Mabey Bridge replacement; and
  - Additional area for Landscaping and Biodiversity Provision.
- 3.2.2 These areas of the Proposed Development Site are shown in **Figure NTS4** below.
- 3.2.3 The Proposed PCC Site covers an area of around 19ha within the west of Keadby Power Station site on an area called Keadby Common, historically associated with a former coal-fired power station that was demolished in the 1990's. The northern areas of Keadby Common where the CCGT and CCP are proposed (referred to as the 'Main Site') are currently grassland, with field drains on each boundary. The southern area of the Main Site is currently temporarily being used for soil storage during construction of the Keadby 2 Power Station.
- 3.2.4 Overhead electricity transmission lines associated with the existing National Grid 400kV Substation cross the Proposed PCC Site and beneath these is an area of unmanaged grassland and scrub. To the south of the pylons, within the Proposed PCC Site is a large area of hardstanding associated with the Keadby 2 Power Station laydown and construction site.
- 3.2.5 In the south of the Proposed Development Site, just north of the Stainforth and Keadby Canal and North Soak Drain, the Proposed PCC Site includes an existing high pressure gas pipeline ('7 Feeder Eastoft') which runs along Bonnyhale Road and is operated by National Grid Gas (NGG). Subject to agreement with NGG, natural gas will be supplied to the Proposed Development using a tie-in to this high pressure gas pipeline.
- 3.2.6 The existing National Grid 400kV Substation is located immediately east of the Proposed PCC Site and is included within the Proposed Development Site to provide an electrical grid connection for the export of low carbon electricity from the Proposed Development into the National Grid electricity transmission system. The Proposed Development Site also includes two potential connection routes to the existing substation owned by Northern Powergrid on Chapel Lane as this may be used

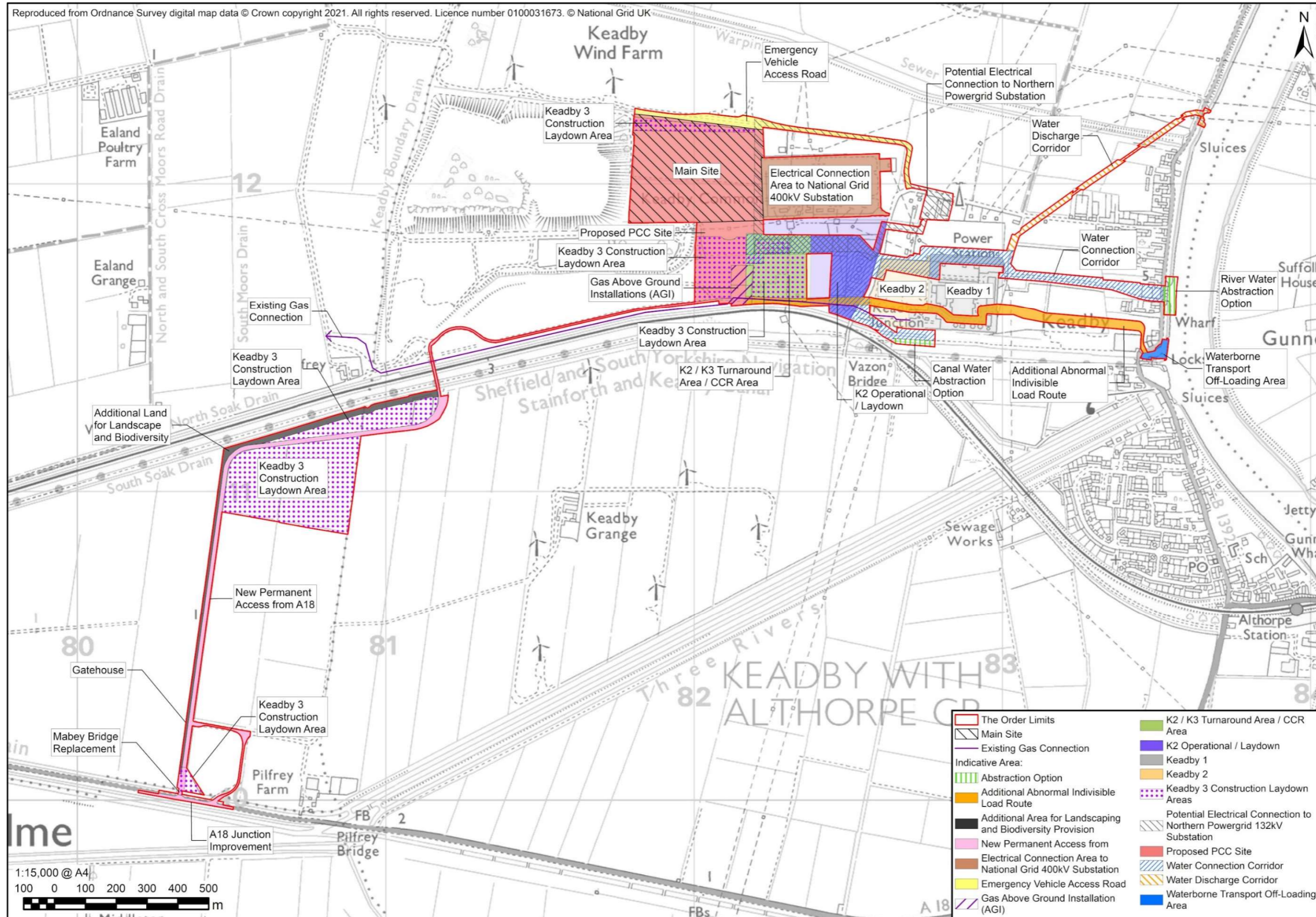
to supply lower voltage electricity to the Proposed Development, for example during plant start-up.

- 3.2.7 The Proposed Development Site includes an emergency vehicle access road which would only be used as a secondary point of access and egress for emergency vehicles and/ or pedestrians in the event of an emergency. A new bridge crossing of a field drain on the northern boundary of the Proposed PCC Site will be constructed and connect into this existing farm access track. This would not be used during construction or normal operation of the Proposed Development.
- 3.2.8 The Proposed Development Site includes land within both Keadby 1 and Keadby 2 Power Station sites required for electricity, water and other necessary connections to the Proposed Development as well as to provide temporary access during construction for abnormal load deliveries.
- 3.2.9 Two potential cooling options are included within the Proposed Development Site as at the time of submission of the DCO Application, technical feasibility work is still ongoing. The preferred option would use water abstracted from adjacent to the new Keadby 2 Power Station cooling water intake within the Stainforth and Keadby Canal. If this is not feasible, the alternative option would use water abstracted from existing cooling water intake within the River Trent. This would need to be modified for the Proposed Development as described in Section 4.0. Whichever water source is used, treated return cooling water will be discharged through the existing Keadby 1 Power Station outfall to the River Trent and so the

easement for this is also included in the Proposed Development Site.

- 3.2.10 As shown on **Figure NTS5**, a waterborne transport offloading area at Railway Wharf, directly adjacent to the River Trent and to the north of Keadby Lock is included in the Proposed Development Site. This would be used during construction to offload abnormal load deliveries arriving by barge on the River Trent, as was undertaken recently for Keadby 2 Power Station. A small (around 5m wide) section of the River Trent is included in the Proposed Development Site to allow for temporary oversail by cranes unloading moored vessels.
- 3.2.11 The Proposed Development Site also includes a temporary haul road used for Keadby 2 Power Station abnormal load deliveries from the Waterborne Transport Offloading Area. This route would be maintained as a temporary haul route, used, and restored following completion of construction of the Proposed Development.
- 3.2.12 It is anticipated that around 20ha of land will be required for construction laydown and so a number of construction laydown areas are included within the Proposed Development Site, shown on **Figure NTS11**. This includes areas within and adjacent to the Proposed PCC Site, but also includes areas of farmland and grassland, south of the Stainforth and Keadby Canal and west of North Pilfrey Bridge including a small area in use for Keadby 2 Power Station.

**Figure NTS4: Areas of the Proposed Development Site Referred to in the ES**



**Figure NTS5: Waterborne Transport Offloading Area**



3.2.13 Access to the Proposed Development Site during construction and permanently during operation would be via the existing access road from the A18. A small permanent gatehouse/ security building and parking provision would be put in place. The junction with the A18 would be improved by providing a right-turn lane into the access road by widening the carriageway slightly to the north. The existing bridge 'Mabey Bridge' will also be replaced in order to provide permanent access to the Proposed Development Site over its 25 year lifetime. A small temporary laydown area will be used near to the junction during these works.

3.2.14 Additional land has been included in the Proposed Development Site to provide landscaping and biodiversity enhancement areas.

### 3.3 Potential Sensitive Receptors

3.3.1 A number of environmental receptors have been identified within and outside the boundary of the Proposed Development Site and are described in more detail in **Chapter 3: The Site and Surrounding Area (ES Volume I – Application Document Ref. 6.2)**. Distances are provided as the shortest distance between the receptor and the closest point of the boundary of the Proposed Development Site and/ or the Proposed PCC Site (including Main Site).

3.3.2 Key receptors for each topic area have been identified as part of the assessment process and details are included in the relevant technical chapters (**Chapters 8 - 19 (ES Volume I – Application Document Ref. 6.2)**). A brief summary is also provided below.

#### Residential Receptors

3.3.3 The nearest settlement is the village of Keadby which is located immediately adjacent to the Water Discharge Corridor and approximately 1km east from the Proposed PCC Site at its closest point. Other settlements nearby include Gunness (580m) to the east on the eastern bank of the River Trent; Althorpe (1.7km) to the south-east; Ealand (2.2km) to the west; and Crowle (3.6km) to the west.

3.3.4 Closer to the Proposed PCC Site are a small number of residential areas and individual residential properties. Those closest residential and other sensitive receptors to the Proposed Development Site include:

- properties along Trent Road including Blacksmiths Cottage (former Trentvale Preparatory School), No. 7 and 8 Mariners Arms Flats and No. 19 Trent Side. The closest of this group of properties is located immediately adjacent to (within 5m of) the Water Connection Corridor (River Water Abstraction Option) and a single residential property (No 5 Trent Side), approximately 35m east of the Additional Abnormal Indivisible Load Route;
- a pair of semi-detached residential properties 'Holly House' and 'Hawthorn House' located adjacent (Hawthorn House) to and 35m west (Holly House) of the Water Discharge Corridor and properties along Chapel Lane, located 50m east of the Water Discharge Corridor;
- an individual property at Vazon Bridge and a further individual property at Roe Farm, approximately 50 – 55m south of the Proposed Development Site boundary, and in addition, Scunthorpe Sea Cadets Boat Station located approximately 55m south of the Proposed Development Site boundary, adjacent to the Stainforth and Keadby Canal;
- Pilfrey Farm, approximately 250m east of the construction access road from the A18 and Keadby Grange, approximately 510m east of the Construction

Laydown Areas, within the agricultural fields north of A18;

- farms along Bonnyhale Road including Ealand Warpings approximately 190m north-west of the Construction and Operational Access Route and North Pilfrey Farm located 225m west of North Pilfrey Bridge;
- North Moor Farm located approximately 520m north of the Potential Electrical Connection to the Northern Powergrid 132kV Substation;
- Boskeydyke Farm located approximately 1.1km north of the Water Discharge Corridor and Amcotts Grange located approximately 1.4km north of the Water Discharge Corridor; and
- Ealand Poultry Farm, located on Bonnyhale Moor Road, approximately 1.6km west of the Proposed PCC Site.

3.3.5 A nearby property shown on OS base mapping 'Red House' was demolished in 2019 and is therefore not included as a receptor.

#### Ecological Receptors

3.3.6 There are no statutory designated sites within the Proposed PCC Site, although the River Trent, which is part of the Humber Special Area of Conservation (SAC), Ramsar site and Site of Special Scientific Interest (SSSI), is crossed by the Proposed Development Site. Thorne



Moor SAC, Hatfield Moor SAC, Thorne and Hatfield Moors SPA are located within the 15km study area.

- 3.3.7 The nationally designated Crowle Borrow Pits SSSI is located 1.2km to the west of the Proposed Development Site. There are several statutory nature conservation designations located beyond this within the 15km study area; this is presented in Table 3.1 of **Chapter 3: The Site and Surrounding Area (ES Volume I - Application Document Ref. 6.2)**.
- 3.3.8 There are no non-statutory designated ecological sites within the Proposed PCC Site although Keadby Boundary Drain Local Wildlife Site (LWS) is directly adjacent. Within the wider Proposed Development Site, the Canal Water Abstraction Option is crossed by the Stainforth and Keadby Canal Corridor LWS. The Hatfield Waste Drain LWS is crossed by Mabey Bridge. Additional non-statutory ecological designations within 2km of the Proposed Development Site are shown in Table 3.2 of **Chapter 3: The Site and Surrounding Area (ES Volume I - Application Document Ref. 6.2)**.
- 3.3.9 Due to the proximity of statutory designated sites, an assessment under the Conservation of Habitats and Species Regulations (2017) is also required. A screening report to inform a Habitat Regulations Assessment (HRA) is provided to accompany the DCO Application (**Application Document Ref. 5.12**) which addresses the potential for likely significant effects on the relevant European sites.

#### Local Transport Receptors including Public Rights of Way

- 3.3.10 Access to the Proposed Development Site during the construction and operation of the Proposed Development would be via the existing tarmacadam access road from the A18, an adopted highway. The existing access to the wider Keadby Power Station site from the B1392, a single-carriageway road that serves the village of Keadby, is not proposed to be used for the Proposed Development during construction or operation.
- 3.3.11 Chapel Lane, an adopted highway, provides local access from Keadby village through the land associated with Keadby 1 Power Station and Keadby 2 Power Station towards Vazon Bridge. Sections of Chapel Lane are included in the Proposed Development Site where crossings are required, for example, the potential Electrical Connection to the Northern Powergrid Substation and Water Connection Corridor. With the exception of these small sections, which during construction, may be subject to temporary traffic management, Chapel Lane will not be used by general construction traffic or staff during construction of the Proposed Development.
- 3.3.12 Other roads within the Proposed Development Site include Ealand Road/ Bonnyhale Road which runs east-west along the southern edge of the Proposed PCC Site. Trent Road, North Road and West Road are all private roads facilitating the movement of traffic within the current Keadby 1 Power Station site and Keadby 2 Power Station

construction site within the Proposed Development Site boundary.

- 3.3.13 The Proposed Development Site intersects a number of other waterborne and rail transport routes (Stainforth and Keadby Canal, River Trent and Scunthorpe to Doncaster passenger rail line).
- 3.3.14 No public rights of way (PRoW) are located within the Proposed Development Site. The nearest PRoW are:
- KEAD 10: a bridleway which runs north-south from Chapel Lane to a point north of Warping Drain. The southernmost point of this footpath is approximately 40m from the Water Discharge Corridor;
  - Footpath CROW11 located along Bonnyhale Road, approximately 250m north-west of the access road for the Proposed Development Site; and
  - Footpath KEAD 9 which runs parallel to Warping Drain east-west from the northern terminus of Footpath KEAD 10 approximately 500m north of the Proposed PCC Site. Footpath LUDD9 joins Footpath KEAD 10.
- 3.3.15 A permissive 'traffic-free cycle route' south of the Stainforth and Keadby Canal is also present together with a number of other PRoW located within the wider surrounding areas.
- 3.3.16 PRoW KEAD 9 and KEAD 10 are shown in **Figure NTS6**.

### Surface Water, Groundwater and Flood Risk

- 3.3.17 The Proposed Development Site and surrounding areas lie within the extensive floodplain of the River Trent which flows in a northerly direction towards the Humber Estuary. Land within the area is generally low lying and relatively flat at elevations below 10m Above Ordnance Datum (mAOD). The area known as the 'Isle of Axholme' has a complex pattern and history of surface water drainage.

**Figure NTS6: View towards the Proposed Development Site from the closest PRoW KEAD10**



- 3.3.18 The River Trent is a large (approximately 150m wide) tidal river. The Environment Agency's 'Flood Map for Planning' classifies the entire Proposed Development Site and surrounding areas generally as Flood Zone 3 which is land assessed as having a 1 in 100 or greater annual probability of river flooding (>1% Annual Exceedance Probability or AEP), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5% AEP) in any year. However, land north of the canal, which includes the majority of the Proposed Development Site, benefits from flood defences (embankments) along the River Trent.
- 3.3.19 The Stainforth and Keadby Canal bisects the Proposed Development Site beneath the existing North Pilfrey Bridge and joins the River Trent to the east of the Proposed Development site at Keadby Lock (**Figure NTS7**).
- 3.3.20 A number of Main Rivers and ordinary watercourses are crossed by the Proposed Development Site or are located within the study area and have been considered in the ES.

#### Cultural Heritage

- 3.3.21 There are no statutory designated sites of the highest value e.g. World Heritage Sites, Scheduled Monuments, Grade I or II\* listed buildings, conservation areas, registered parks and gardens, registered battlefields or protected wreck sites within the Proposed Development Site. Outside of the Proposed Development Site boundary, the closest high value asset is the Scheduled Monument (and Grade II listed building) at Keadby Lock

on the Stainforth and Keadby Canal, located adjacent to the Waterborne Transport Offloading Area.

**Figure NTS7: View east along Keadby Lock [1005204; 1342734] at its exit to the River Trent, adjacent to the Waterborne Transport Offloading Area**



- 3.3.22 One further scheduled monument lies approximately 4.4km north-east of the Proposed Development Site at Flixborough Saxon Nunnery and Site of All Saints Medieval Church and Burial Ground.
- 3.3.23 The closest listed building to the Proposed Development Site is the Grade II listed Keadby Lock, noted above. Other listed buildings in the study area are concentrated in settlements at Keadby, Althorpe, Gunness, Ealand and

Crowle, as well as features associated with land improvement such as late-18th to early-19th century drainage syphons and sluices

- 3.3.24 The nearest conservation area is located in Crowle approximately 3.2km west of the Proposed Development Site and provides the context and setting for 14 listed buildings including the Grade I listed Church of St Oswald.
- 3.3.25 The non-designated Isle of Axholme area of Special Historic Landscape Interest lies 2km south of the Proposed PCC Site. A number of non-designated standing buildings and below-ground non-designated heritage assets are recorded within the vicinity of the Proposed Development Site. Other non-designated assets have been determined as a result of fieldwork to investigate archaeological potential presented in **Appendix 15B** and **Appendix 15C** (ES Volume II – **Application Document Ref. 6.3**).

#### Landscape and Visual Receptors

- 3.3.26 The Proposed Development Site lies within the Humberhead Levels National Character Area (NCA) which is a flat, low-lying and large-scale agricultural landscapewithin and within the Trent Levels Landscape Character Area (LCA) which is characterised as a flat, open floodplain landscape with long distance views with little diversity in character. The Proposed Development Site and its immediate surroundings are heavily influenced by industrial structures of the existing Keadby Power Station Site as well as Keadby Wind Farm, overhead

electricity pylons and transmission lines converging near the existing Keadby 1 and Keadby 2 Power Stations. There are no natural features of noteworthy landscape value within the Proposed Development Site.

- 3.3.27 The surrounding area is largely arable, with local villages including Keadby village directly east of the Proposed Development Site. The extent of views available to receptors range from close proximity to long distance views. A number of receptors are located at the edge of villages, along roads and along PRoW where the landform is low lying. The rising landform in the east and localised areas of slightly raised ground around the Isle of Axholme in the south-west allows for elevated long-distance views towards the Proposed Development Site.

#### Agricultural Land Classification

- 3.3.28 The majority of the Proposed Development Site (including the Proposed PCC Site) is located within land classified as Grade 2 (very good) agricultural land. Land within the Construction Laydown Areas within the agricultural fields south of the Stainforth and Keadby Canal is classified as Grade 1 (excellent quality).

## 4.0 THE PROPOSED DEVELOPMENT

### 4.1 Components of the Proposed Development

4.1.1 The Proposed Development includes the construction, operation, maintenance and eventual decommissioning of a low carbon CCGT generating station with a capacity<sup>3</sup> of up to 910MW electrical output together with equipment required for the capture and compression of carbon dioxide emissions from the generating station.

4.1.2 The Proposed Development is described in detail in **Chapter 4: Proposed Development (ES Volume I – Application Document Ref. 6.2)**.

4.1.3 In summary the Proposed Development comprises:

- a carbon capture equipped electricity generating station including a CCGT plant, cooling infrastructure, a carbon dioxide capture plant (CCP) including one or two absorption unit(s) and stack(s), conditioning and compression equipment, natural gas receiving facility and supporting activities, all located in the area referred to as the 'Proposed PCC Site' and which together form **Work No. 1**);

- natural gas pipeline to supply the power station including infrastructure to connect to National Grid Gas's apparatus (**Work No. 2**) (the 'Gas Connection Corridor');
- electrical power export lines to the existing National Grid Electricity Transmission (NGET) 400kV Substation (**Work No. 3A**) (the 'Electrical Connection Area to National Grid 400kV Substation') and electrical power import lines from the existing Northern Powergrid Substation on Chapel Lane to supply electricity at up to 132kV (**Work No. 3B**) (the 'Potential Electrical Connection to Northern Powergrid 132kV Substation');
- Water Connection Corridors to provide cooling and make-up water including:
  - a water supply pipeline and intake structure within the Stainforth and Keadby Canal, including temporary cofferdam (**Work No. 4A**) (the 'Canal Water Abstraction Option'); or
  - in the event that the canal abstraction option is not available, works to the existing Keadby 1 Power Station cooling water supply pipeline and intake structure within the River Trent, including temporary

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<sup>3</sup> The electrical generation capacity will be lower under normal operations when the emissions of carbon dioxide from the CCGT are captured in the Carbon Capture Plant.

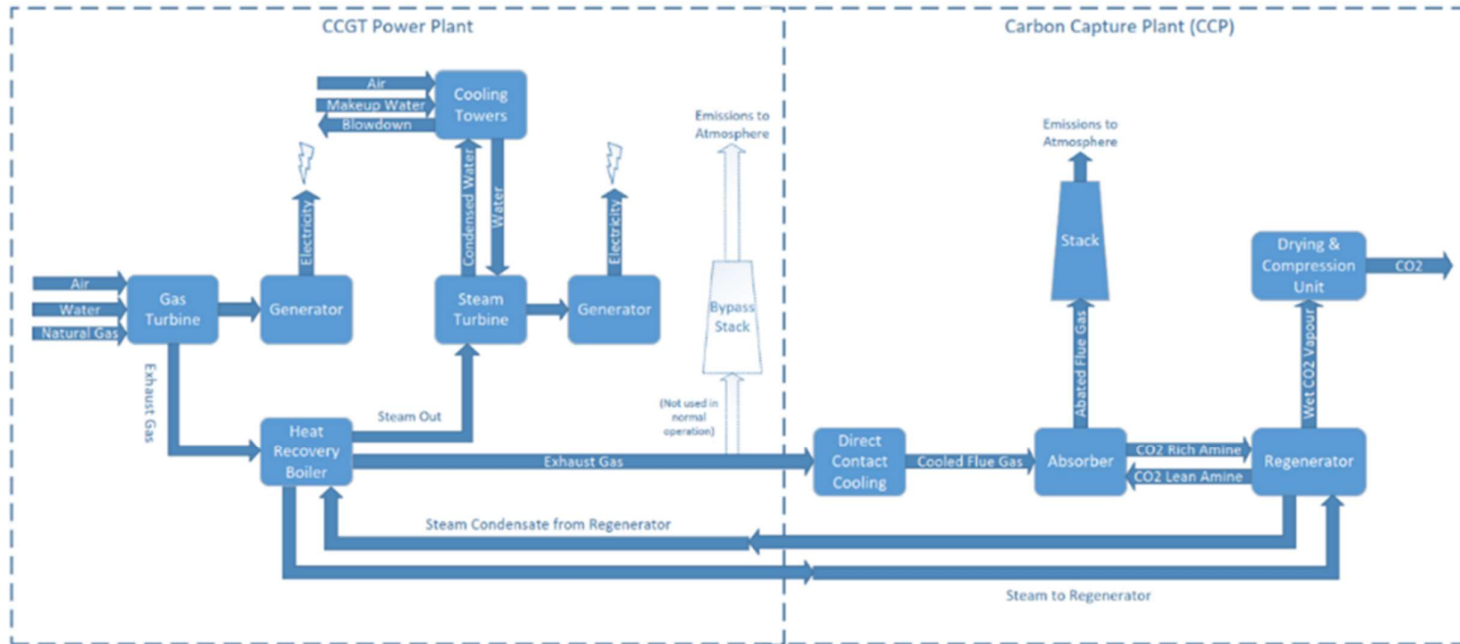
- cofferdam (**Work No. 4B**) (the 'River Water Abstraction Option');
- works to and use of an existing outfall and associated pipework for the discharge of return cooling water and treated wastewater to the River Trent (**Work No. 5**) (the 'Water Discharge Corridor');
- towns water connection pipeline to provide potable water (**Work No. 6**);
- above ground carbon dioxide compression and export infrastructure (**Work No. 7A**) to connect to National Grid Carbon's apparatus (**Work No. 7B**);
- new permanent access from A18, including the replacement of Mabey Bridge, installation of a layby and gatehouse and an emergency vehicle and pedestrian access road between the Proposed PCC Site and Chapel Lane, including new private bridge (**Work No. 8**);
- temporary construction and laydown areas (**Work No. 9**);
- temporary use and restoration of an existing Additional Abnormal Indivisible Load Haulage Route and temporary use and placement of mobile crane(s) at the existing Railway Wharf jetty for a Waterborne Transport Offloading Area (**Work No. 10**); and
- landscaping and biodiversity enhancement measures (**Work No. 11A**) and security fencing and boundary treatments (**Work No. 11B**).

4.1.4 Various associated and ancillary development that may be required in connection with the above works are detailed in Schedule 1 'Authorised Development' of the draft DCO (**Application Document Ref. 2.1**). This along with **Chapter 4: The Proposed Development** (ES Volume I - **Application Document Ref. 6.2**) provides further description of the Proposed Development. The areas within which each numbered Work (component) of the Proposed Development are to be built are defined by the coloured and hatched areas on the Works Plans (**Application Document Ref. 4.3**).

4.1.5 After a period of baseload operation, it is expected that the Proposed Development will generally operate in dispatchable mode i.e. be able to export power to match the anticipated intermittency of renewable power in the future power market. The CCP will be designed to be capable of capturing at least 90% of the carbon dioxide emitted from the power station, likely to be through the use of an amine-based solvent. This captured carbon dioxide will be compressed for transport to offshore storage.

4.1.6 A schematic illustration of the Proposed Development is shown on **Figure NTS8**. A single high efficiency CCGT unit and associated CCP are to be developed on the Proposed PCC Site. Natural gas that has been conditioned to the required temperature and pressure will be combusted in the CCGT. The gas turbine selected will be provided with burner technology to minimise the formation of nitrogen oxides (NO<sub>x</sub>).

Figure NTS8: Schematic of Proposed Development



4.1.7 Following combustion in the gas turbine, the hot product gases will enter the gas turbine where they will expand across the blades of the turbine causing it to rotate and drive an electrical generator. The gas turbine exhaust gases will be passed through the Heat Recovery Steam Generator (HRSG) to recover useful heat in order to produce steam (at various pressures) to generate further power via a separate steam turbine, and for heating of process streams within the CCP.

4.1.8 Flue gases will be treated with Selective Catalytic Reduction (SCR) a technology used to further remove NO<sub>x</sub> to the required Emission Limit Values (ELV) as prescribed by an Environmental Permit that will be required for the operation of the Proposed Development. Although it will be possible to discharge exhaust gases through a dedicated stack above the HRSG building (for example during outages of the CCP), during normal operation, this will not happen and use of this is anticipated to be infrequent.

- 4.1.9 Instead, the hot flue gases will enter the integrated CCP as shown in **Figure NTS8**. The CCP will be designed to be capable of capturing at least 90% of the carbon dioxide emitted from the generating station. Once cooled, the flue gases from the generating station will be introduced to one or two absorber column(s) where they will be passed through a solvent that will remove the carbon dioxide from the gas stream. The solvent to be used is the subject of ongoing technical studies but is likely to be a solution of amines, with alkaline properties that selectively absorb acidic gases such as carbon dioxide.
- 4.1.10 The captured carbon dioxide will be treated in a gas conditioning facility to a specification to be agreed with National Grid Carbon suitable for export. It is assumed that the carbon dioxide would be cooled, partly compressed and traces of water and oxygen would be removed before metering and export to the Humber Low Carbon Pipeline to be developed by National Grid Carbon.

## 4.2 Design Parameters

- 4.2.1 The detailed design of the Proposed Development is not yet completed. However, the final design will be within the parameters assessed within the ES (**Application Document Ref. 6.2 – 6.4**) and presented in the draft DCO (**Application Document Ref. 2.1**).
- 4.2.2 Where design details cannot yet be finalised, a conservative approach has been adopted whereby the option that gives rise to the worst-case potential environmental impacts and effects has been assessed in

the ES (**Application Document Ref. 6.2 – 6.4**). This is known as the Rochdale Envelope approach and is further explained in Advice Note Nine: Using the Rochdale Envelope (Planning Inspectorate, 2018a).

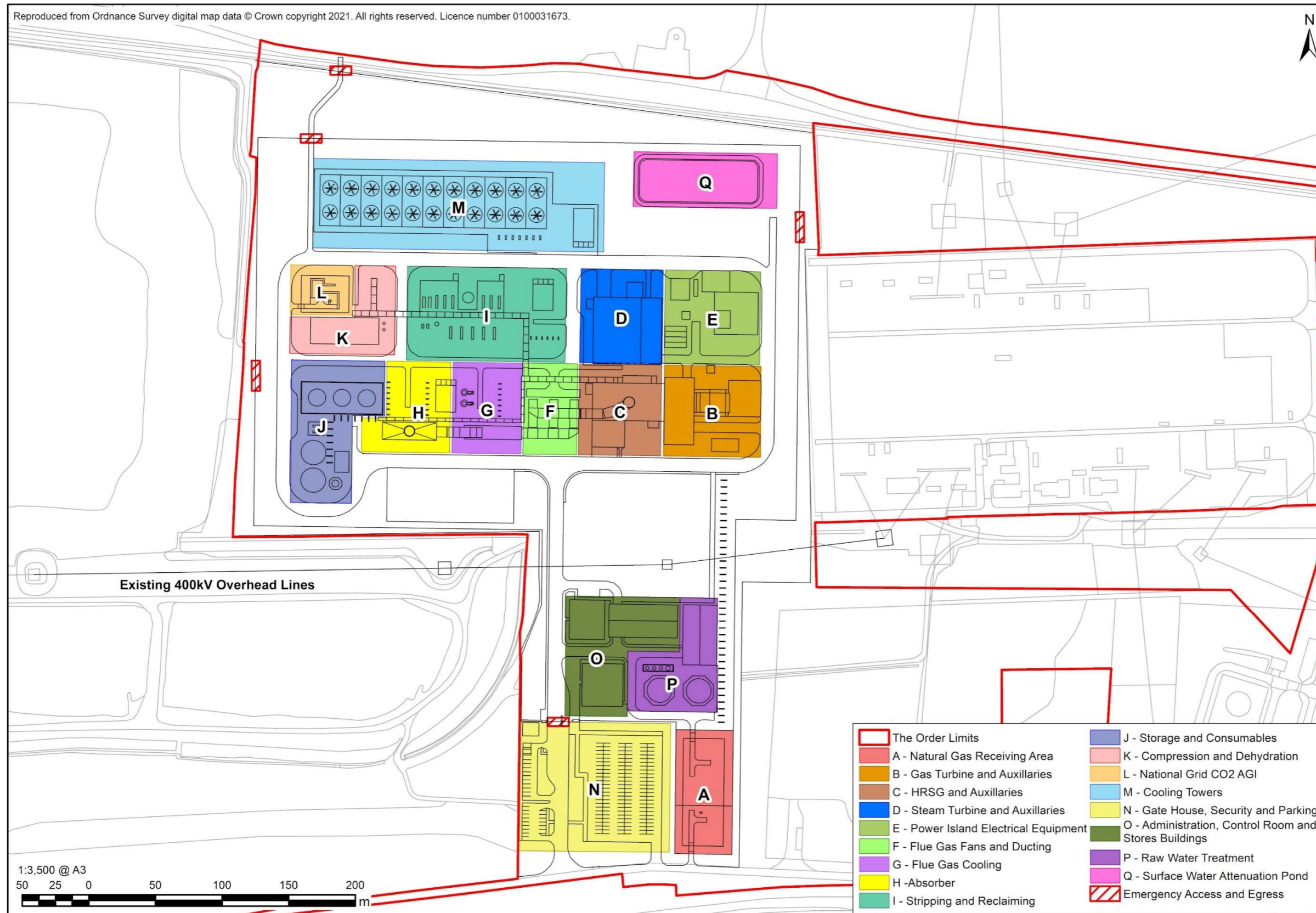
- 4.2.3 **Figure NTS10** shows an indicative layout of the Proposed PCC Site. Depending on the final technology selection and subject to detailed design, the CCGT and CCP including absorber stack(s) would be located within the defined Work Areas 1A and 1C (Application Document Ref. 4.3) i.e. within the Main Site on the northern part of the Proposed PCC Site. An indicative layout based upon maximum dimensions is shown on **Figure NTS9**.

### Figure NTS9: Visualisation of the Proposed PCC Site based upon maximum dimensions





**Figure NTS10: Indicative Proposed PCC Site Layout**



### 4.3 Proposed Development Construction

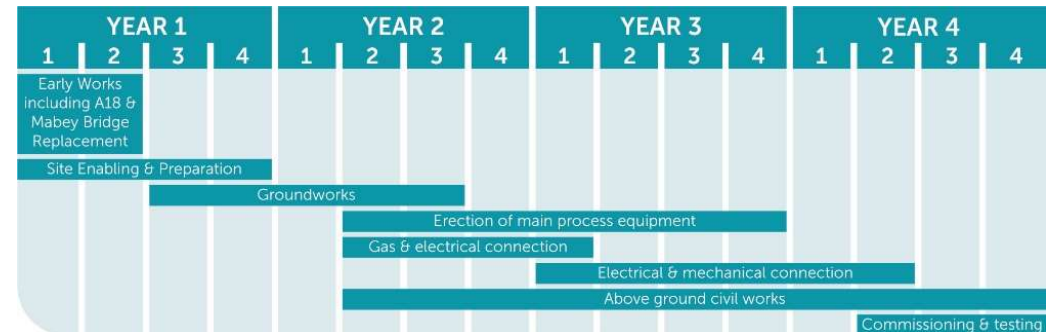
4.3.1 Construction of the Proposed Development could (subject to the necessary consents being granted and an investment decision being made) potentially start as early as Quarter 4 2022 when it is anticipated the consent would be granted. Construction activities are expected to be completed within three – four years, followed by commissioning, however detailed phasing will be the responsibility of the appointed Contractors.

4.3.2 Each environmental assessment topic within the ES identifies and assesses the reasonable ‘worst-case’ construction scenario for that topic, where relevant. The DCO Application seeks consent for commencement of development up to seven years from the date of granting of consent. For this reason, a scenario where construction commences later in the programme, up to 2029 has also been assumed as a reasonable worst-case for some technical assessments such as traffic and transport in the ES.

4.3.3 The Applicant would appoint contractor(s) to undertake the construction phase of the Proposed Development. The Applicant would retain overall responsibility for the project and would ensure that the works would be undertaken in accordance with legal requirements.

4.3.4 An indicative construction programme is outlined in **Table 3** below.

**Table 3: Indicative Construction Programme**



4.3.5 Core construction working hours would be 07:00 to 19:00 Monday to Friday (except bank holidays) and 08:00 to 13:00 on Saturdays. However, it is likely that some construction activities may need to be undertaken outside of these core working hours, subject to agreement with North Lincolnshire Council.

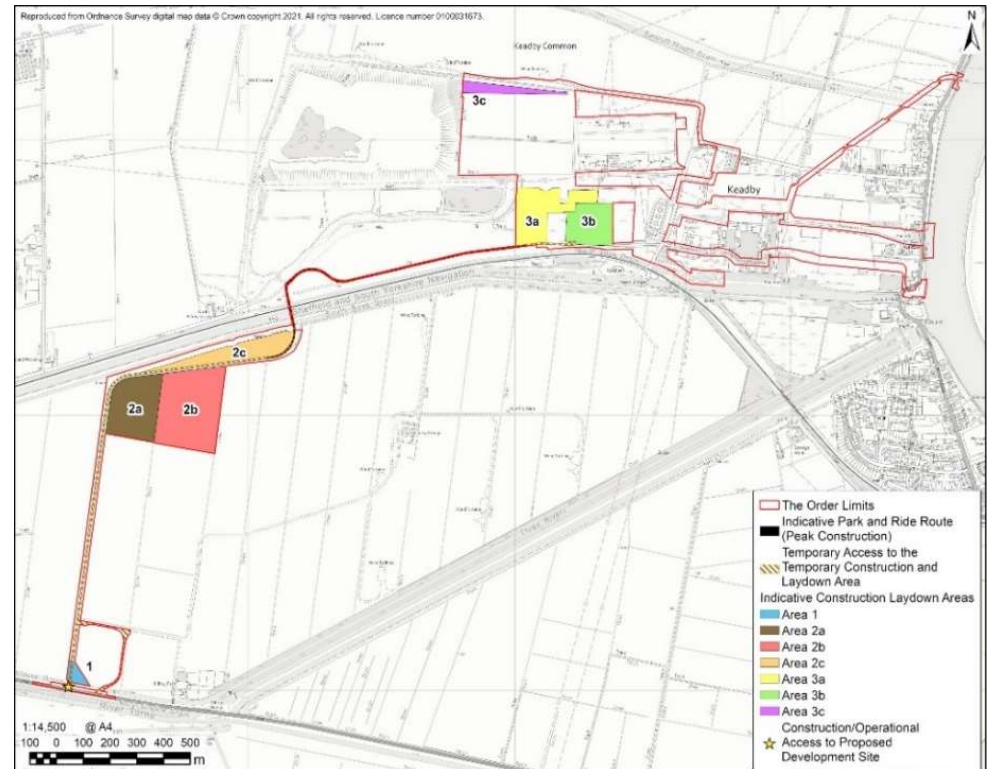
4.3.6 A detailed Construction Environmental Management Plan (CEMP) will be prepared prior to construction. The submission, approval and implementation of this will be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**). A Framework CEMP (**Application Document Ref. 7.1**) has been prepared and is submitted to accompany the DCO Application. The Framework CEMP sets out the key measures to be employed during construction to control and minimise the impacts on the environment.

4.3.7 Early works over an approximate 6 month period will include the widening of the A18 and replacement of

Mabey Bridge to provide permanent access into the Proposed Development Site. Piling works using continuous flight auger methods are likely to take place for the new bridge and the existing deck will be removed before the main new structure is constructed and installed.

cycle parking etc. **Figure NTS11** below shows the indicative construction laydown areas.

**Figure NTS11: Construction Laydown Areas**



4.3.8 After this, during the approximate 3 year main works construction phase for the Proposed PCC Site, earthworks may be required to produce a level platform, excavate foundations, import engineering fill material and/ or remove surplus material or remediate contaminated soils. Off-site waste arisings would be minimised as far as possible, although some excess material is likely to be generated and need to be transported off-site and some additional fill material will need to be imported to improve the ground conditions. The main Proposed Development Site access from the A18 would be used by all Heavy Goods Vehicles (HGV). Any excess spoil generated during construction will be managed through the Site Waste Management Plan (SWMP) that would form part of the final CEMP.

4.3.9 Construction laydown areas and a contractor's compound will be required. In order to assess a worst-case in the ES, it has been assumed that around 20ha of construction laydown will be required for materials and plant storage and laydown areas which would also be used for fabrication and erection of plant and equipment, concrete batching facilities, vehicle and

- 4.3.10 The contractor will prepare and level the Proposed PCC Site, followed by piling and excavation for main foundations of large structures. Plant and equipment will be pre-fabricated where practicable, however, certain larger items of plant may need to be fabricated and erected on-site due to their anticipated size or weight.
- 4.3.11 A new natural gas connection pipeline would link into Keadby Power Station's existing natural gas supply infrastructure at a location within the Proposed PCC Site. Construction will be undertaken by a National Grid Gas approved contractor.
- 4.3.12 Depending on which cooling water option is selected, either a new intake would be constructed near to the intake for Keadby 2 Power Station within the Stainforth and Keadby Canal, or alternatively the existing water abstraction infrastructure for Keadby 1 Power Station within the River Trent would be upgraded. In order to undertake works safely, a temporary cofferdam, installed using sheet piling techniques, would extend into the canal or river. A view of the cofferdam within the Stainforth and Keadby Canal in place during Keadby 2 Canal Water Intake construction is shown on **Figure NTS12**. Whichever abstraction option is selected, a water pipeline would be constructed from the intake into the Proposed PCC Site. The chosen method(s) will depend on a number of technical and environmental factors and are likely to include open cut methods for parts of the route. Some of the

existing pipework that runs along Trent Road may be able to be re-used if the River Water Abstraction Option is selected, but this would need to be extended into the Proposed PCC Site.

**Figure NTS12: Typical cofferdam that would be required on the canal, adjacent to the intake for Keadby 2 Power Station**





**Figure NTS13: of River Water Abstraction Option**

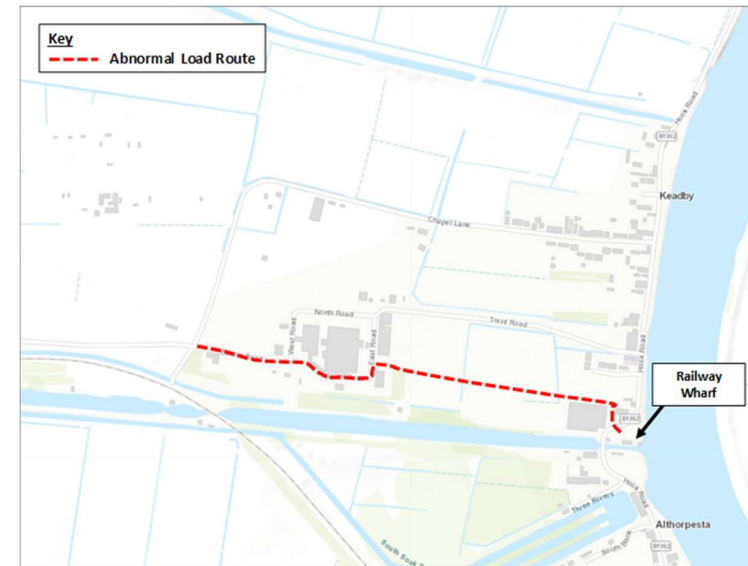
- 4.3.13 As the River Trent is tidal at this point, the construction of any works within the river would be controlled by the Marine Management Organisation under the conditions of a Marine Licence, a draft of which is included in the draft DCO (**Application Document Ref. 2.1**). Construction of any works within the river would be undertaken in compliance with the Marine and Coastal Access Act (2009). There would also be a requirement for a Flood Risk Activity Permit (FRAP) from the Environment Agency. The need for this, and other consents and licenses that are separate to the DCO is explained in **Application Document Ref. 5.4: Schedule of Other Consents and Licences**.

- 4.3.14 Other potential connections to the Proposed PCC Site include a low voltage electrical connection (up to 132kV) that may be constructed to supply the Proposed Development from the Northern Powergrid Substation on Chapel Lane. Underground construction will require the use of an 'open-cut' method, with a trench excavated, and the cables laid below ground.
- 4.3.15 Construction temporary site lighting is proposed to enable safe working on the construction site in the hours of darkness. Glare will be minimised outside of the construction site in accordance with the principles set out in the Indicative Lighting Strategy (**Application Document Ref. 5.11**) and secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**).
- 4.3.16 Access to the Proposed Development Site during construction for workers and for all HGV would via the existing access road from the A18 via Mabey Bridge. It is estimated that there will be up to around 1,300 personnel contracted to work on the Proposed Development at the peak of construction. In order to manage travel to the Proposed Development Site, a Construction Workers' Travel Plan (CWTP) is proposed to be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**). A Framework CWTP (**Application Document Ref. 7.3**) has been produced to accompany the DCO application.

4.3.17 HGV movements, including deliveries and abnormal loads arriving at/ departing from the Proposed Development Site, would be controlled by a final Construction Traffic Management Plan (CTMP) including HGV and abnormal load routing strategy. A Framework CTMP has been produced to accompany the Application (**Application Document Ref. 7.2**). This would require, for example, all HGV to arrive and depart from the west via the A18, A161 and M180 Junction 2.

4.3.18 Three potential routes are available and have been assessed for abnormal loads. It is proposed that the largest abnormal loads will be received at the Port of Immingham and transported by boat to the Waterborne Transport Off-Loading Area (**Figure NTS5**). Around 35 - 40 abnormal loads may be delivered this way over a 12-month period. Consistent with Keadby 2 Power Station construction abnormal load deliveries, they would be offloaded using mobile crane(s). Temporary traffic management ('stop/go signs') would be required to allow the abnormal loads to cross a short section of the B1392 before entering the Proposed Development Site via the temporary haul road to the east of PD Port Services freight yard. The route is shown on **Figure NTS14**.

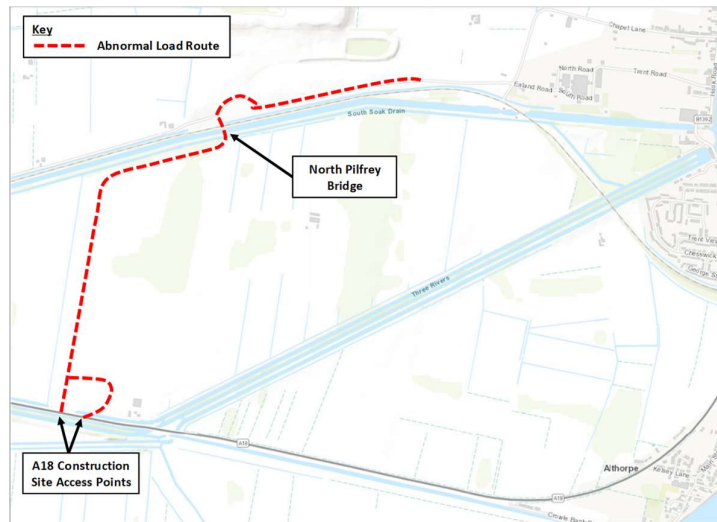
**Figure NTS14: Abnormal Indivisible Load Route via Waterborne Transport Offloading Area for Proposed Development**



4.3.19 Smaller abnormal loads are expected to be transported by road from Immingham Dock via the M180 to Junction 2 and then from the A161 to the A18, entering the Proposed Development Site via either the perpendicular construction access or, if required, the skewed construction access off the A18 as shown on **Figure NTS15**.

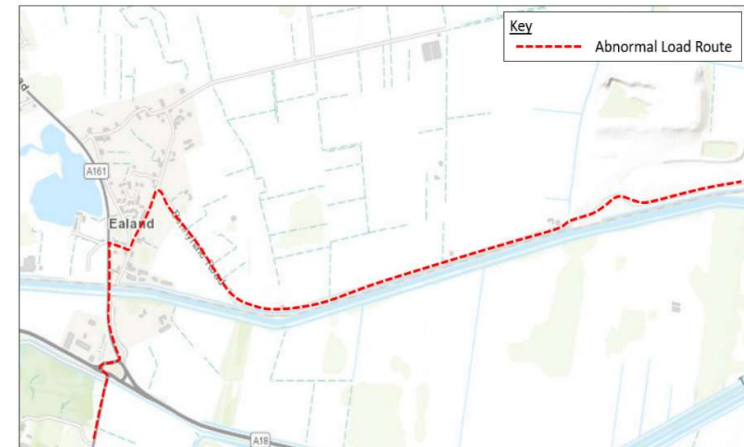
4.3.20

**Figure NTS15: Proposed access route for abnormal loads**



- 4.3.21 An alternative access route for certain AIL that cannot pass over Pilfrey Bridge and that has been used during construction of Keadby 2 Power Station is via Bonnyhale Road. This route, shown in **Figure NTS19** would only be used where other AIL routes are not feasible.

**Figure NTS16: Alternative proposed access route for certain abnormal loads (avoiding North Pilfrey Bridge)**



#### 4.4 Proposed Development Operation

- 4.4.1 The facility will be designed to operate 24 hours per day, 7 days per week, with programmed offline periods for maintenance.
- 4.4.2 Operation of the Proposed Development is anticipated to create around 50 operational roles. Temporary and contractor employees associated with maintenance activities would also be employed, as required.
- 4.4.3 The operation of the Proposed Development would be regulated by the Environment Agency through an Environmental Permit. This permit would be used to

control normal emissions to the environment from the plant and would also consider potential abnormal operation scenarios and prevention or minimisation of accidents, through the use of management procedures and process monitoring. The Proposed Development would also comply with the Industrial Emissions Directive (IED) so that the impact of emissions to air, soil, surface and ground water, to the environment and human health would be minimised.

- 4.4.4 Routine maintenance will be planned and scheduled via the maintenance management system to ensure the Proposed PCC Site including utility connections operates safely. Major overhauls will occur approximately once every two to five years depending on the nature of the plant operations in that period.
- 4.4.5 Permanent access to the Proposed Development Site during operation would be via the existing road access from the A18 which passes via the existing North Pilfrey Bridge over the Stainforth and Keadby Canal and the Scunthorpe to Doncaster passenger rail line.

#### **4.5 Proposed Development Decommissioning**

- 4.5.1 The power generation and carbon capture elements of the Proposed Development would have a design and operational life of around 25 years; therefore, decommissioning activities would not commence until after 2051 at the earliest. For the purposes of assessing flood risk, an operational life of 35 years has

been assessed to take into account future climate change scenarios.

- 4.5.2 At the end of operation, it is expected that the Proposed Development will have some residual life remaining and an investment decision would then be made based on the market conditions prevailing at that time. If the operating life were to be extended, the Proposed Development would be upgraded in line with the legislative requirements at that time.
- 4.5.3 A Decommissioning Plan (including Decommissioning Environmental Management Plan (DEMP)) will be produced within the period specified in the relevant legislation in force at the time of cessation of operations and agreed with the Environment Agency as part of the Environmental Permit and site surrender process.



## 5.0 CONSIDERATION OF ALTERNATIVES

### 5.1 Introduction

5.1.1 The EIA Regulations state that an ES should include a description of reasonable and relevant alternatives studied by an applicant and the main reasons for selecting the chosen development, taking into account the environmental effects. **Chapter 6: Consideration of Alternatives (ES Volume I - Application Document Ref. 6.2)** provides this information in respect of the Proposed Development.

5.1.2 The detailed design of the Proposed Development has not yet been completed but has continued to evolve up to the point of submission of the DCO Application in response to consultation feedback (explained in the Consultation Report - **Application Document Ref 5.1**) and with reference to surveys and technical studies which are now complete.

### 5.2 Alternatives considered

5.2.1 In summary, alternatives have been considered during the evolution of the Proposed Development including:

- alternative technologies and fuels;
- alternative sites;
- alternative design options and design evolution;

- alternative layouts and temporary construction laydown areas within the Proposed Development Site; and
- alternative layouts and design options within the Proposed Development Site.

5.2.2 The environmental effects of these alternatives has been compared to inform the Proposed Development layout and design.

5.2.3 The Proposed Development includes an appropriate degree of flexibility in the dimensions of buildings and structures to allow for the selection of the preferred technology and contractors. In order to ensure a robust assessment, a maximum built 'envelope' (also referred to as the 'Rochdale envelope') has been defined to accommodate this necessary flexibility and to enable the EIA to consider the 'worst-case'. For example, the landscape and visual impact assessment has assessed the largest massing of buildings and tallest structures that could be required.

5.2.4 The Proposed PCC Site was identified as being the most suitable for the following key reasons:

- the Proposed PCC Site (and the majority of the Proposed Development Site) is within the ownership of the Applicant, is brownfield land and is adjacent to the existing Keadby Power Station;
- sufficient space is available within the Proposed PCC Site to accommodate the required scale of

power generation and carbon capture infrastructure (in particular, a single high efficiency CCGT unit and a CCP), without encroaching on the exclusion areas for the Keadby Wind Farm turbines to the north and the existing overhead lines to the south and east;

- the Proposed PCC Site enables connections to be developed to electrical, gas and future planned Humber Low Carbon Pipeline infrastructure;
- there is an absence of major structures requiring demolition, treatment and removal on the Main Site footprint;
- the plot minimises interference with the Landscape and Creative Conservation Plan for Keadby 2 Power Station;
- the Proposed Development Site avoids, as far as reasonably practicable, areas of the highest (national) biodiversity value within the former Keadby Ash Tip that were previously (at EIA Scoping Stage) under consideration for construction laydown;
- it is located in close proximity to the existing Keadby 1 and proposed Keadby 2 Power Stations, providing opportunities for synergies, efficiencies and thus economic and environmental benefits for the Proposed Development; and
- adequate supplies of cooling water can be provided via the nearby Stainforth and Keadby

Canal or River Trent, whilst existing infrastructure for discharge of the treated effluent into the River Trent can also be utilised.

- 5.2.5 The land required for the Proposed Development has been refined down since the PEI Report was published in November 2020. The PEI Report considered the effects of development of an indicative approximately 88 ha of land. The final Order Limits have been refined down to just over 69ha, with opportunities sought to minimise the extent in particular of construction laydown areas, whilst at the same time, increasing land provided for landscaping and biodiversity management and enhancement.

## 6.0 SUMMARY OF ENVIRONMENTAL EFFECTS

- 6.1.1 This section provides a summary of the likely environmental effects predicted to occur as a result of the construction, operation, maintenance and decommissioning of the Proposed Development. These likely significant environmental effects are fully described in ES Volume I (**Application Document Ref. 6.2**) and its accompanying technical appendices (ES Volume II - **Application Document Ref. 6.3**).
- 6.1.2 An assessment of the environmental effects of the Proposed Development during its construction and operation (including maintenance) has been completed for each of the topics that have been scoped for inclusion within the EIA. During the eventual decommissioning of the Proposed Development, for the purposes of the EIA the effects are considered likely to be comparable to, or less than, those for construction activities (and controlled similarly) and therefore although these are discussed in each chapter of the ES, decommissioning effects have not been specifically mentioned within this NTS unless otherwise stated.
- 6.1.3 A summary of likely significant residual effects (effects that are likely to occur even after the implementation of mitigation measures) is outlined in **Chapter 20: Summary of Likely Significant Residual Effects** (ES Volume I – **Application Document Ref. 6.2**).

## 6.2 Air Quality

- 6.2.1 **Chapter 8: Air Quality** (ES Volume I – **Application Document Ref. 6.2**) considers potential impacts and effects from the Proposed Development on both human health and ecological receptors.
- 6.2.2 The air quality assessment uses screening tools and computer models to predict the dispersion of air emissions from the Proposed Development including emissions associated with the construction of the Proposed Development and emissions from the proposed stacks (chimneys) of the operational development. These predict concentrations of pollutants in ambient air which are compared to national air quality standards where available, or other appropriate levels as agreed with regulators.
- 6.2.3 Emissions assessed include:
- construction dust;
  - exhaust emissions from construction site plant or Non-Road Mobile Machinery (NRMM);
  - exhaust emissions from construction road vehicles;
  - process emissions from the operational plant; and
  - the proposed development as a whole.

### Likely Impacts and Effects

- 6.2.4 Through the use of standard construction management measures, which reduce dust and emissions from site clearance and site preparation activities, emissions to air from construction activities are assessed to have no significant adverse effects on human or ecological receptors. Such measures would include standard best practice construction measures such as appropriate storage of materials, suppression of dust from soil movement and material storage, cleaning of vehicles and locating construction plant away from sensitive receptors; through control of emissions in the Final CEMP, effects of construction dust are assessed as **not significant**.
- 6.2.5 Based on expected vehicle movements, construction traffic air impacts are considered to be negligible at all human receptors and the effect is therefore assessed as **not significant**.
- 6.2.6 The impact of abnormal loads (waterborne transport) is considered to be negligible (**not significant**) due to the limited number of vehicles and river vessels requiring access and the limited duration of activities and the intermittent hours.
- 6.2.7 The environmental effects on air quality from construction of the Proposed Development have therefore been identified as **not significant**. No additional mitigation other than the use of the CEMP
- has been identified as necessary for the construction phase of the Proposed Development.
- 6.2.8 During operation, impacts could arise due to process emissions from the operational Proposed Development (stack emissions, including ammonia based emissions which are assessed in respect of human health).
- 6.2.9 Emissions from operational road traffic are considered negligible based on predicted traffic volumes and the effect is therefore assessed as **not significant**.
- 6.2.10 An assessment of operational effects of the Proposed Development has been undertaken using atmospheric dispersion modelling and taking into account a number of conservative assumptions.
- 6.2.11 Predicted ground level concentrations of relevant air pollutants (principally nitrogen oxides, ammonia and amines) due to air emissions from the operation of the Proposed Development have been assessed. Effects as a result of the Proposed Development at the identified human receptors are assessed as **not significant**.
- 6.2.12 The deposition of nutrient nitrogen on sensitive ecological receptors from the air emissions of nitrogen oxides and ammonia has also been calculated. Effects from Proposed Development emissions are assessed to be **not significant**.

6.2.13 Emissions from the Proposed Development during operation will be carefully controlled and regulated by the Environment Agency through the Environmental Permit and in accordance with the use of Best Available Techniques (BAT). The Permit must be granted prior to operation of the Proposed Development. The Applicant is working with the Environment Agency and other parties to determine BAT for carbon capture plants given the first of a kind nature of the Proposed Development. An application for a permit in principle is being prepared by the Applicant for submission to the Environment Agency for determination alongside the DCO application.

6.2.14 An assessment of visible plume formation from the cooling plant has been undertaken which indicates that a short (less than 5m) visible plume may be present for the around one-quarter of the time the Proposed Development is operational which would be classified as **not significant**.

### 6.3 Noise and Vibration

6.3.1 A noise and vibration assessment has been undertaken and is presented in **Chapter 9: Noise and Vibration (ES Volume I – Application Document Ref. 6.2)**.

6.3.2 Key noise sensitive receptor (NSR) locations have been selected which are considered to be representative of the nearest and potentially most sensitive existing receptors in all directions around the

Proposed Development. It is considered that if noise and vibration levels are suitably controlled at the NSR identified, then noise and vibration levels will be suitably controlled at other sensitive receptors in the surrounding area.

6.3.3 Noise levels during construction and operation of the Proposed Development have been predicted by computer modelling and the results compared with measured baseline noise levels at the identified receptors during the day, evening and night. National standards have been applied to determine whether there is the potential for significant effects without further mitigation measures being applied.

6.3.4 The assessment has also considered the potential for vibration effects from construction, operation and decommissioning of the Proposed Development. Vibration is likely to occur for a short period of the construction works as piling is likely to be required for some of the main structures on the Proposed PCC Site, for installation of a cofferdam within either the River Trent or Stainforth and Keadby Canal and for the replacement Mabey Bridge.

#### Likely Impacts and Effects

6.3.5 Noise is likely to be generated throughout the construction phase through works such as initial site preparation, earthworks and excavation, construction of buildings and infrastructure including piling,

operation of temporary facilities, as well as from construction traffic on the local road network.

- 6.3.6 Construction noise effects at all residential NSR during construction of the Proposed PCC Site within core working hours are predicted to be **not significant** due largely to the distances between the works and the NSR.
- 6.3.7 It may be necessary for some construction activities to take place continuously over day, evening and night periods during peak construction times of the Proposed Development, although the exact nature of the works is unknown at this stage. If construction works take place continuously over night-time periods, assuming the same intensity of working as for the daytime, there would be the potential for significant adverse noise effects at some NSR for works to replace Mabey Bridge, on the Proposed PCC Site and potential connection to the Northern Powergrid 132 kV Substation. Construction activities taking place outside core working hours will therefore be planned, managed and controlled appropriately so they do not exceed the significant observed adverse effect level (SOAEL) threshold values or relevant limit agreed with North Lincolnshire Council.
- 6.3.8 Without mitigation, daytime working in the vicinity of properties on Trent Road, (NSR 4) is predicted to result in significant adverse effects in the short-term during sheet piling in the event that the River Water Abstraction Option is selected during cofferdam

installation. This is largely due to the short distance between the closest of the properties in this NSR group to the noise source. Additional mitigation is therefore proposed and may include use of a temporary acoustic barrier, enclosure or other measures.

- 6.3.9 The control of construction noise is proposed to be secured by a Requirement in the draft DCO (**Application Document Ref. 2.1**). The preferred approach for controlling construction noise and vibration is to reduce levels at source, where reasonably practicable and to use best practicable means (BMP) for construction noise mitigation. On the basis that mitigation is employed such that the relevant noise limits are met and the mitigation measures set out in the CEMP are followed, residual (after mitigation) effects are assessed as minor (**not significant**). Construction noise will be controlled by the CEMP which will also be secured through a Requirement of the draft DCO. A Framework CEMP is included as **Application Document Ref. 7.1**. Further detailed assessment would be undertaken once a contractor is appointed and working methods are established.
- 6.3.10 Vibration effects resulting from the required sheet piling for cofferdam installation/ removal for both the River Water Abstraction option and Canal Water Abstraction Option are classified as **not significant**.

- 6.3.11 It is anticipated that there will be either no change or a very low change in road traffic noise due to traffic flows along the construction traffic routes of the Proposed Development. Therefore, effects at local residential NSR are predicted to be **not significant**.
- 6.3.12 During operation, the Proposed Development will include a CCGT and other plant and equipment that is similar to the Keadby 2 Power Station, together with the CCP for capture of carbon dioxide emissions. Modelling software has been used to assess the likely effects of operational noise at NSR using conservative assumptions to provide a worst-case assessment. Without additional mitigation, there could significant effects at some properties, particularly at night when background noise levels are lower.
- 6.3.13 Application of practical sound mitigation to reduce relevant noise at source within the Proposed PCC Site will therefore be undertaken during detailed design, and an operational noise control scheme (including agreed noise limits) will be prepared and is proposed to be secured by a Requirement of the draft DCO (**Application Document Ref 2.1**). Mitigating through detailed design to limits to be agreed with North Lincolnshire Council will result in effects that are classified as **not significant**. These measures would demonstrate use of Best Available Techniques (BAT) for the control of noise for the Environmental Permit.

## 6.4 Traffic and Transport

- 6.4.1 An assessment has been undertaken which considers the potential effects of the construction, operation (including maintenance) and decommissioning of the Proposed Development on traffic and transport; this is presented within **Chapter 10: Traffic and Transportation** (ES Volume I – **Application Document Ref. 6.2**) and is supported by **Appendix 10A: Transport Assessment** (ES Volume II - **Application Document Ref. 6.3**).
- 6.4.2 The assessment considers the predicted number of vehicle movements generated during the construction and operation of the Proposed Development, and the sensitivity (including pedestrian and cyclist safety) and capacity of the local road network. Public rights of way (PRoW), including footpaths and cycle route networks, that cross roads within the study area have also been considered and have helped define the sensitivity of the road links.
- [Likely Impacts and Effects](#)
- 6.4.3 As baseline traffic flows on the road network are projected to increase year on year, to undertake a worst-case assessment, a future year for baseline traffic flows of 2031 has been modelled. This is the anticipated 'peak construction' year for traffic if the DCO consent was not implemented until 7 years after being granted (2022).

- 6.4.4 The additional traffic due to Proposed Development construction activities would result in temporary increases of traffic flows, including HGV, on the roads leading to the Proposed Development Site. The effects of construction traffic on pedestrian amenity, severance, fear and intimidation, highway safety, driver delay and hazardous loads have been assessed using relevant guidance. Effects at all road sections and junctions within the study area are anticipated to be **not significant**.
- 6.4.5 A number of traffic management measures would be implemented during the Proposed Development construction phase to minimise traffic impacts upon the local road network. This would include both a CTMP and CWTP that the appointed contractors would need to adhere to – framework versions of these documents are included with the DCO Application (**Application Document Ref. 7.3** and **Application Document Ref. 7.2**).
- 6.4.6 As has been implemented during construction of Keadby 2 Power Station, a Temporary Traffic Regulation Order (TTRO) would likely be sought to reduce speed on the A18 in the vicinity of the Proposed Development during construction, to be secured at the appropriate time prior to construction via North Lincolnshire Council as highway authority.
- 6.4.7 During the operational phase during up to 50 staff would be employed, working two shifts. Additionally, during planned maintenance and outages which may

occur infrequently (once every 2-5 years) and be short-lived (approximately 3 months), approximately 200 additional staff could be on-site on any one day. Additional HGV traffic would also be generated by deliveries associated with operations and maintenance plant/ equipment. Traffic flows during operation would be considerably lower than those during construction. Overall, traffic effects during operation would be **not significant**.

## 6.5 Biodiversity and Nature Conservation

- 6.5.1 An assessment has been undertaken of the potential effects of the construction, operation (including maintenance) and decommissioning of the Proposed Development on biodiversity and nature conservation in **Chapter 11: Biodiversity and Nature Conservation** (ES Volume I – **Application Document Ref. 6.2**).
- 6.5.2 The baseline information has been determined through a combination of desk studies and field surveys, detailed within **Appendices 11C to 11H** (ES Volume II – **Application Document Ref. 6.3**).
- 6.5.3 There are six international and 23 national statutory nature conservation and biodiversity designations within the overall 15km study area including the Humber Estuary Special Area of Conservation (SAC), Ramsar site and SSSI designations within the River Trent, which is crossed by the Proposed Development Site. As is required, an assessment of the likely significant effects of the Proposed Development on



these sites has been undertaken to inform the appropriate assessment screening to be undertaken under the Habitats Regulations and is provided as **Application Document Ref. 5.12**. A further 11 local non-statutory nature conservation designations (local wildlife sites or LWS) occur within a 2km study area.

6.5.4 The scope of works for necessary habitat and protected species surveys was confirmed through a Phase 1 Habitat survey and Preliminary Ecological Appraisal (PEA) provided as **Appendix 11C** (ES Volume II – **Application Document Ref. 6.3**). An assessment of impacts and effects on all relevant habitats and species has been undertaken.

#### Likely Impacts and Effects

##### *Designated Sites*

6.5.5 Construction of the Proposed Development has the potential to affect the designated biodiversity features of interest of the Humber Estuary SAC, Ramsar site and SSSI in the River Trent through:

- potential air quality impacts 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.

6.5.6 Through embedded mitigation including restrictions on construction timings, methods (particularly 'soft start' piling), and the duration of and restrictions on the progression of piling should a cofferdam be required in the River Trent, which would be secured in the Final CEMP to be prepared in accordance with the Framework CEMP (**Application Document Ref. 7.1**), the assessment concludes that there are no likely pathways for significant impacts on the conservation status of relevant fish species using the River Trent.

6.5.7 Overall, the potential construction effect on the Humber Estuary SSSI, SAC and Ramsar site is assessed as **not significant**. Any construction works within the (tidal) River Trent would be controlled by a deemed Marine Licence (DML) – a draft of which has been agreed with the Marine Management Organisation (MMO) and is included in the draft DCO (**Application Document Ref. 2.1**).

6.5.8 Should the preferred Canal Water Abstraction be selected, the intake would be constructed within the Stainforth and Keady Canal Corridor LWS, designated

for its aquatic and wetland plant interest, in a similar way to the works recently completed for Keadby 2 Power Station. The potential construction effect on the LWS is assessed as **not significant**.

6.5.9 There are no likely significant direct or indirect construction impacts and effects on any other statutory nature conservation designations.

6.5.10 Potential impacts during the operational phase that could result in effects on ecological features have been assessed including:

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

6.5.11 Based on the findings of the air quality impact assessment, effects from NO<sub>x</sub> are anticipated to be **not significant** when taking into consideration the existing pollutant levels and wider context of status of the condition of the designated sites. Effects of nitrogen deposition from emissions from the Proposed Development are also assessed as **not significant** at all relevant designated sites.

### *Habitats*

6.5.12 As described in Section 5.0, the design of the Proposed Development, including temporary laydown areas, has evolved to avoid significant effects. The highest value habitats within the wider Keadby Power Station have been largely avoided as the Proposed Development Site boundary has been refined. These include nationally important open mosaic habitat (OMH) and acid grassland although very small scale losses of these, and other habitats such as scattered scrub would occur as a result of site clearance. The effect of these minor habitat losses is assessed as **not significant**.

6.5.13 Construction of the Main Site would result in the loss of one minor field drain which is of local biodiversity and nature conservation value. The localised and relatively small-scale permanent construction impacts on other drains would not affect the wider nature conservation status of drain habitats and effects on watercourses is therefore assessed as **not significant**.

### *Species*

6.5.14 No significant effects are predicted on terrestrial species or their conservation status as a consequence of construction activities, based on the absence (or in the case of bats and water vole, low levels of) activity of such species within and near the Proposed

Development Site. The potential construction effect on all species is therefore assessed as **not significant**.

- 6.5.15 However appropriate pre-construction surveys will be undertaken prior to works commencing to confirm that no protected species are present in working areas.
- 6.5.16 The Indicative Lighting Strategy (**Application Document Ref. 5.11**) will secure the sensitive design of permanent external artificial lighting. The effect on bats from external lighting required for operation of the Proposed Development is therefore assessed as **not significant**.
- 6.5.17 Works required for cooling water abstraction, whether within the Stainforth and Keadby Canal, or within the River Trent will be agreed with regulators and undertaken to provide compliance with the Eels Regulations. No impact pathways would be 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 effect is therefore assessed as **not significant**.
- 6.5.18 Proposals to enhance the biodiversity, landscape and green infrastructure value of the Proposed Development Site and to achieve an overall net gain for biodiversity for Proposed Development are described within the Landscaping and Biodiversity Management and Enhancement Plan (**Application Document Ref. 5.10**).

6.5.19 The proposals have been designed to be delivered within the existing land ownership of the Applicant and focus on enhancing the value of existing habitats within the vicinity of the Proposed Development to include:

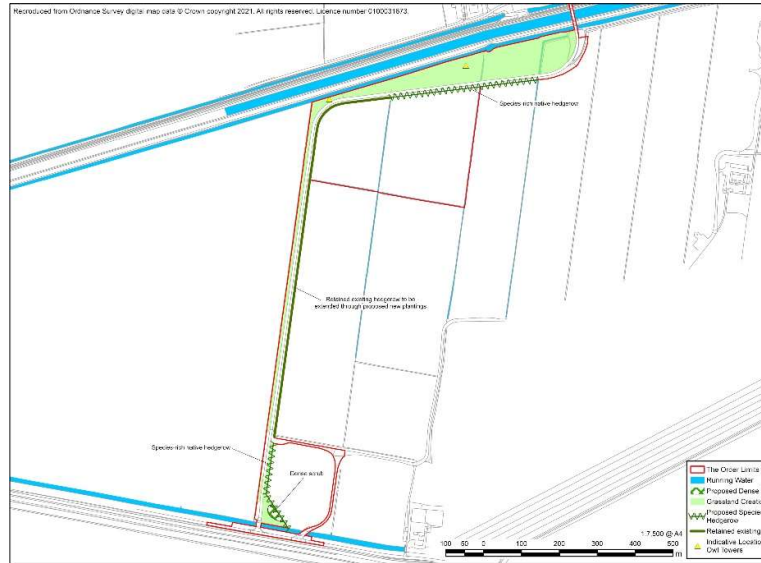
- creation of flower-rich native grassland;
- new species-rich native hedgerow plantings (**Figure NTS17**);
- enhancement of field drains for water voles and other aquatic biodiversity; and
- installation of nest boxes for barn owl and other birds, habitat creation for willow tit, and installation of roosting boxes for bats.

6.5.20 The proposals shown in **Figure NTS18** and **Figure NTS19** would provide no net loss and overall, demonstrate a net gain of around 10% for habitats as a result of the Proposed Development.

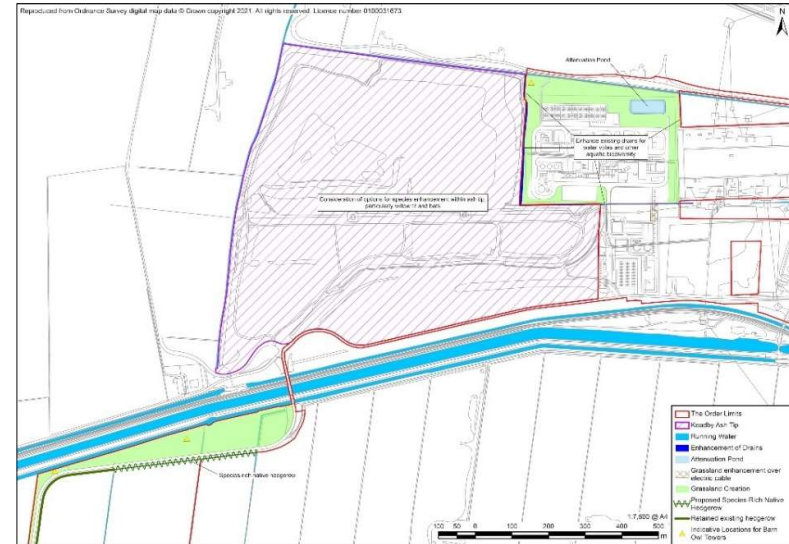
**Figure NTS17: Existing Hedgerow Habitats would be improved**



**Figure NTS18: Biodiversity Management and Enhancement Plan in southern extent of Proposed Development Site.**



**Figure NTS19: Biodiversity Management and Enhancement Plan in northern extent of Proposed Development Site**



## 6.6 Water Environment and Flood Risk

6.6.1 An assessment has been undertaken which considers the potential effects of the Proposed Development on the water environment and flood risk, presented in **Chapter 12: Water Environment and Flood Risk (ES Volume I – Application Document Ref. 6.2)**.

6.6.2 Key water bodies that may receive runoff or discharges either during construction or operation or be affected by temporary construction works have been identified, and the potential contamination risk to these water bodies has been assessed. The study area for surface water has been defined based on the potential for impacts to occur i.e. the surrounding 1km and includes those watercourses crossed by or close to the Proposed Development Site outlined in Section 3.0 of this NTS as well as numerous ordinary watercourses in the study area.

6.6.3 The Proposed Development Site lies within the extensive floodplain of the River Trent within the Isle of Axholme and is largely classified as Flood Zone 3 (high risk) as described in Section 3.0.

Likely Impacts and Effects

6.6.4 Currently, the Proposed Development Site is at a 'low' risk of flooding from tidal sources with the defences in place. During a future scenario resulting from climate change up to 2068, the residual risk of flooding from 'overtopping' of the tidal defences increases the risk to 'high', using the conservative assumption that there would be no raising of the Trent tidal defences by third parties to mitigate this increased risk to the wider area due to climate change.

6.6.5 Potential impacts on flooding, including the current and future (with climate change) risk of flooding from all sources (tidal, fluvial, surface water, groundwater, artificial sources and drainage infrastructure) has been undertaken including a site specific breach model considering this potential future worst-case event that the tidal Trent flood defences were to breach in a future climate change scenario. The results are presented in **Appendix 12A: Flood Risk Assessment (ES Volume II – Application Document Ref. 6.2)**.

6.6.6 A range of mitigation measures are proposed to mitigate this residual risk so that the occupiers of the Proposed Development Site are safe and critical

operational infrastructure associated with the CCGT can continue to operate. The modelling has been used to set the final development platform level and finished floor levels for the Proposed PCC Site which would be secured via a Requirement of the draft DCO (**Application Document Ref. 2.1**) to ensure that the Proposed Development remains safe throughout its lifetime. Other measures such as a Flood Emergency Response Plan and allocation of a place of safe refuge in case of flooding are also proposed.

6.6.7 It is proposed to discharge surface water runoff from the Proposed Development Site to Keadby Common Drain and/ or to the River Trent via the existing cooling water discharge, following sustainable urban drainage systems (SuDS) attenuation. Surface water discharge would be restricted to the existing greenfield runoff rate and therefore the risk of flooding would not be exacerbated by the Proposed Development.

6.6.8 A detailed drainage strategy, which will have regard to the findings of the of the FRA and water quality assessment, will be defined and prepared for the Proposed Development in consultation with the Environment Agency, the Lead Local Flood Authorities (North Lincolnshire Council) and other bodies such as the local Internal Drainage Board.

6.6.9 With these measures, the effects on surface water drainage and flood risk as a result of the Proposed Development are anticipated to be **not significant**.

- 6.6.10 Potential impacts on the Water Framework Directive status of the Proposed Development have been considered and are detailed in **Appendix 12B: Water Framework Directive Assessment (ES Volume II – Application Document Ref. 6.3)**.
- 6.6.11 The assessment has considered potential effects for the construction and operational phases in relation to the following:
- temporary impacts on surface water quality; and
  - temporary impacts on morphology (structure) of watercourses.
- 6.6.12 Construction activities such as earthworks, excavations, site preparation, levelling and grading operations can result in the disturbance of soils, and changes to groundwater and surface water runoff and flows which result in impacts upon groundwater and surface water resources. There is a risk that leaks and spillages of hazardous substances could pollute nearby surface watercourses if their use is not carefully controlled and spillages enter existing waterbodies. Through the use of a CEMP and embedded mitigation, including water quality monitoring, no significant adverse effects are predicted for the water environment during construction. The effect on all waterbodies is considered **not significant**.
- 6.6.13 The localised and temporary impacts on the morphology (shape) of the River Trent and Keadby Canal habitats has been assessed during construction as a result of a cofferdam that would need to be installed in one of these watercourses for the proposed cooling water intake works. The effects are assessed as **not significant**. Where physical works to other watercourses are required, such as the need for new bridge or service crossings, localised, temporary adverse impacts may occur but the effects of these are assessed as **not significant**.
- 6.6.14 One minor field drain would be lost on Proposed PCC Site. Waterbodies directly to the west and north-west of the Proposed PCC Site, including Keadby Boundary Drain LWS, would not be affected by the loss. Through the implementation of habitat creation opportunities which focus on enhancement of field drains and use of SuDS, effects are assessed as **not significant**.
- 6.6.15 Cooling water from the Proposed Development Site will discharge to the River Trent under an Environmental Permit, regulated by the Environment Agency and be subject to monitoring and limit values on chemical and thermal releases. The effects of thermal discharges have been considered in the design of the Proposed Development and assessed as having a negligible (**not significant**) impact on the temperature status of the River Trent that would not provide a barrier to migratory routes for fish.

- 6.6.16 No changes are likely to impact on Water Framework Directive classifications for the River Trent or any of the other waterbodies within the study area.
- 6.6.17 Connections into existing infrastructure within the Proposed Development Site will be made for foul water and it is anticipated this would be treated at the local treatment works on Chapel Lane. The impact of foul water discharge is therefore considered to be **not significant**.
- 6.6.18 Navigational Risk associated with construction activity and the use of Railway Wharf for delivery of abnormal indivisible loads (AIL) has been considered within **Appendix 12C: Navigational Risk Assessment** (ES Volume II – **Application Document Ref. 6.3**). The assessment has been informed by technical engagement with relevant marine stakeholders, such as the Canal and River Trust, Maritime and Coastguard Agency, Trinity House and ABP Humber (as appropriate Navigational Authority).
- 6.6.19 The assessment has considered the potential effects associated with construction activity, including the use of workboats and a cofferdam, at the Canal Water Abstraction Option and the River Water Abstraction Option; the potential use of workboats within the Water Discharge Corridor Outfall has also been considered.
- 6.6.20 The use of the Waterborne Transport Offloading Area (Railway Wharf) for AIL movements has also been considered in terms of passage, presence of additional vessels and docking activity.
- 6.6.21 With the application of mitigation as detailed within Section 6.6 of **Appendix 12C: Navigational Risk Assessment** (ES Volume II – **Application Document Ref. 6.3**), it is considered that all risks can be reduced to a level As Low as Reasonably Practicable (ALARP) and can be suitably managed by risk controls to reduce them to an acceptable level (**not significant**).
- ## 6.7 Geology, Hydrogeology and Land Contamination
- 6.7.1 An assessment has been undertaken which considers the potential effects of the construction, operation (including maintenance) and decommissioning of the Proposed Development on geology, groundwater and land contamination and is presented in **Chapter 13: Geology, Hydrogeology and Land Contamination** (ES Volume I – **Application Document Ref. 6.2**). A desk-based assessment of historical ground conditions information and information from historical site investigations has been used to identify the potential effects associated with ground conditions using a source-pathway-receptor risk based approach. This is presented in **Appendix 13A: Phase 1 Desk-based Assessment** (ES Volume II – **Application Document Ref. 6.3**).
- 6.7.2 The status of the bedrock geology (Mercia Mudstone Group) and superficial deposits has been described previously in Section 3.0 including status of aquifers.

Bedrock is anticipated to be present at an approximate depth of 14m below ground level. A naturally high groundwater table is present across the study area and it is anticipated that groundwater is likely to be present near surface (1m to 3m below ground level) within the superficial deposits. Groundwater vulnerability to pollution is classified as medium-high. There are no local potable water abstractions, although abstractions for agricultural and industrial uses are present in the study area.

#### Likely Impacts and Effects

6.7.3 The construction phase may introduce new sources of contamination due to leaks and spillages and could disturb and mobilise existing contamination within soils. Historical and current areas of potential contamination have been identified and areas of higher risk defined within **Appendix 13A** (ES Volume II - **Application Document Ref. 6.3**) will be subject to further assessment before construction to inform the development of the detailed design and to validate assumptions made in the initial risk assessment.

6.7.4 Potential impacts during the construction phase include:

- mobilising existing contamination in soil and groundwater as a result of ground disturbance and potential dewatering;

- increasing the potential for contaminants in unsaturated soils to leach to groundwater in open excavations;
- increasing the potential for contaminated surface run-off to migrate to surface water and groundwater receptors as a result of leaching from uncovered stockpiles;
- introducing new sources of contamination, such as fuels and oils used in construction plant;
- creating preferential pathways for the migration of soil contamination and gases, for example, along new below ground service routes, service ducts and as a result of potential dewatering; and
- introducing new human health receptors such as site staff during and post construction.

6.7.5 Best practice measures would be adopted to minimise pollution risks including the adoption of working methods to manage contamination risk to soils, groundwater, surface water, implementation of appropriate pollution incident control plans and procedures and the safe storage of fuel, oils and equipment. Requirements of the draft DCO (**Application Document Ref. 2.1**) provide a scheme to deal with any contamination of land, including groundwater, likely to cause significant harm.

6.7.6 Impacts will be managed by appropriate construction mitigation measures (which will be outlined in the final



CEMP) and as such adverse effects are not anticipated and have been assessed as **not significant**.

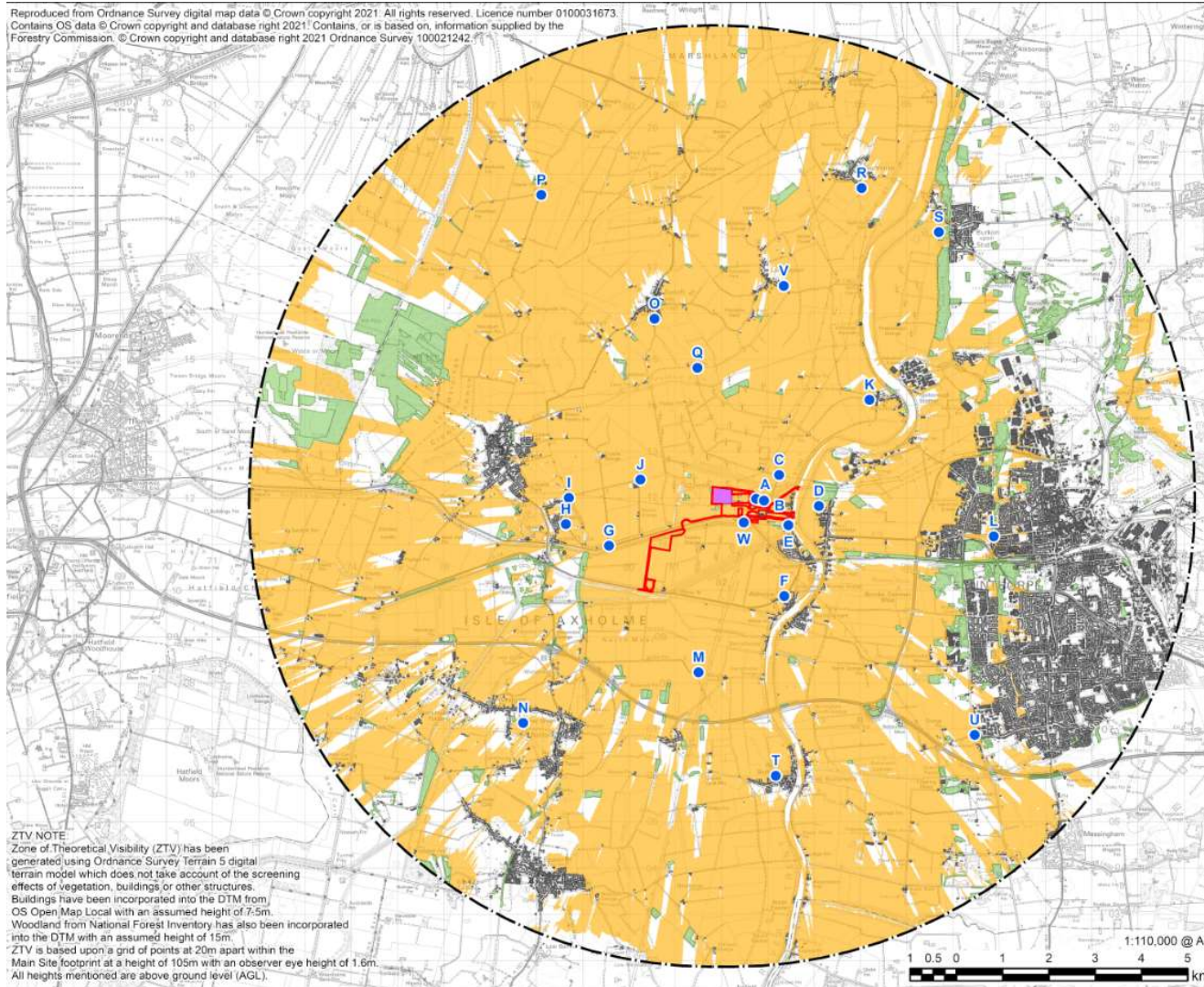
- 6.7.7 Potential impacts to soil quality, groundwater and watercourses could potentially occur during operation as a result of accidental spills from the handling or leakage of fuels, lubricants, stored chemicals and process liquids. However, with appropriate management, housekeeping and preventative maintenance practices (such as appropriate storage of potentially contaminating chemicals), as required by the Environmental Permit that will be needed for the operational Site, potential impacts to soil and groundwater will be minimised. As such, effects have been assessed as **not significant**.

## 6.8 Landscape and Visual Amenity

- 6.8.1 An assessment has been undertaken which considers the potential effects of the construction, operation (including maintenance) and decommissioning of the Proposed Development on landscape character and visual amenity and is presented in **Chapter 14: Landscape and Visual Amenity (ES Volume I – Application Document Ref. 6.2)**.
- 6.8.2 Baseline data has been gathered through desk study, review of aerial photography, consultation and site visits, including obtaining summer and winter photography from key viewpoints.

- 6.8.3 Visibility within the study area is generally widespread. Tree and shrub cover within the study area is generally sparse and the topography is low lying and flat. Due to the limited intervening vegetation, there are frequent, open views in the north-west and east towards the Proposed Development Site. Visibility from the south and south-west is more restricted due to existing buildings and topography.

- 6.8.4 The study area for landscape and visual effects includes areas where it is considered that there is potential for significant direct or indirect effects on landscape character or sensitive views due to the construction or operation of the Proposed Development. The area in which the Proposed Development is likely to be visible has been defined using a computer model which shows the 'Zone of Theoretical Visibility' (ZTV) considering the largest possible dimensions for the Proposed Development and worst-case stack height up to 105m above existing ground level which would be 107.6m AOD considering the finished floor levels proposed. The ZTV and 10km radius study area used to identify locations which have potential views of the Proposed Development and those where visibility would be unlikely is shown on **Figure NTS20**. Final viewpoints and sensitive receptors were identified through these methods and agreed with regulatory bodies.



**Figure NTS20: Zone of Theoretical Visibility and Potential Viewpoints Assessed**

6.8.5 The study area includes a number of areas designated locally for their landscape character and/ or perceived qualities/ tranquillity, whilst being heavily influenced by industrial developments, residential areas and transport corridors and includes a proposed extension to the Lincolnshire Wolds Area of Outstanding Natural Beauty (AONB). The Proposed Development Site and immediate surrounding area is heavily influenced by power related industrial structures. Wind turbines are prominent features in the landscape alongside large pylons and transmission lines converging near Keadby 1 Power Station and Keadby 2 Power Station (under construction).

#### Likely Impacts and Effects

6.8.6 The potential landscape impacts of the Proposed Development primarily relate to the visibility of proposed structures (temporary and permanent), including how this affects the overall landscape character of the area. The Proposed Development is assessed as likely to result in a low or very low impact on landscape character during construction, opening and operation because the additional built form is similar to that already within the Keadby Power Station. Effects on landscape character are assessed **as not significant**.

6.8.7 Changes in views may give rise to adverse or beneficial visual effects, through obstruction in views, alteration of the parts of the view and the opening up

of new views by removal of screening. To help to interpret the visual effects of the Proposed Development, a number of photomontages have been prepared which indicate existing baseline views and also representations of the Proposed Development using the maximum proposed heights of key elements in the Proposed Development. These are illustrated for one of the assessed viewpoints in **Figure NTS21-Figure NTS24** below.

6.8.8 A total of 13 viewpoints have been assessed; the majority would experience visual amenity effects that are classified as adverse, but **not significant** during construction and operation of the Proposed Development. At three of the closest receptors at Viewpoint 1 (Chapel Lane West, Keadby), Viewpoint 2 (Gate Keepers Residence, Vazon Bridge, Keadby) and Viewpoint 4 (PRoW KEAD9 and KEAD10), effects would be classified as **significant** due to the introduction of built structures against the skyline, making them more prominent and extending the amount of the view which includes large scale development.

6.8.9 Opportunity for mitigation of visual amenity effects is limited due to the size and scale of the Proposed Development and construction plant. An integrated design approach for Proposed PCC Site to minimise potential effects has the potential to reduce visual impacts of the Proposed Development.

**Figure NTS21: Viewpoint 4 - PRoW (KEAD9, KEAD10), north of Keadby – Baseline Summer View**



**Figure NTS22: Viewpoint 4 - PRoW (KEAD9, KEAD10), north of Keadby – Baseline Winter View**



**Figure NTS23: Viewpoint 4 - PRoW (KEAD9, KEAD10), north of Keadby – Wireline view with Proposed Development in Summer**



6.8.10 Red elements would be visible, blue elements would not be visible

**Figure NTS24: Viewpoint 4 - PRoW (KEAD9, KEAD10), north of Keadby - View with Proposed Development in Winter**



6.8.11 A Landscaping and Biodiversity Management and Enhancement Plan (**Application Document Ref. 5.10**) accompanies the DCO application which presents proposals for planting, although such planting would not reduce the significance of visual effects at these locations.

## 6.9 Cultural Heritage

6.9.1 This assessment addresses the potential effects of the Proposed Development on cultural heritage assets. It identifies the location, type and significance of cultural heritage assets and their setting, and reports on the predicted impacts of the Proposed Development on these resources. The assessment considers the likely significance of effects upon cultural heritage assets by reference to their significance and the magnitude of any impacts and is presented in **Chapter 15: Cultural Heritage** (ES Volume I – **Application Document Ref. 6.2**). A detailed desk based assessment is presented in **Appendix 15A: Cultural Heritage Desk Based Assessment** (ES Volume II - **Application Document Ref. 6.3**) and the results of field investigation undertaken comprising hand augering and geophysical survey are presented in **Appendix 15B** and **Appendix 15C** (ES Volume II - **Application Document Ref. 6.3**). A summary of cultural heritage assets is included in Section 3.0 of this NTS.

### Likely Impacts and Effects

- 6.9.2 Construction effects consider the setting impacts on above ground scheduled monuments and built heritage, as the buildings and structures of the Proposed Development are installed and constructed. They also consider potential effects on below-ground archaeology.
- 6.9.3 Construction of the Proposed Development has the potential to affect heritage assets in the following ways:
- removal of below ground heritage assets;
  - compaction of archaeological remains by construction traffic and structures;
  - changes to local waterbodies that could dry out any peat deposits and therefore affect preservation of potential heritage assets;
  - vibration effects that could cause physical damage; and
  - other adverse effects on the setting of heritage assets e.g. due to visual intrusion, noise etc.
- 6.9.4 Impacts on built heritage for a range of receptors have been assessed. Impacts to the setting of Keadby Lock (scheduled monument and Grade II listed) and other designated assets such as listed buildings and conservation areas are assessed as **not significant**. The exception to this is the effect on the Isle of

Axholme Area of Special Historic Landscape Interest (non-designated heritage asset) as a consequence of the Proposed Development, including a new permanent security gatehouse close to the A18 which have the potential to be significant. Impacts will be mitigated through the detailed design of the gatehouse through agreement of matters including siting, layout, scale and external appearance, including the colour, materials and surface finishes' which are proposed to be secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**).

6.9.5 Impacts to below ground archaeological remains are likely to derive from the following construction works:

- piles, pile caps, ground beams and floor slabs;
- any required ground remediation;
- levelling of surfaces for Construction Laydown areas;
- installation of any below ground surface water attenuation tanks; and
- burial of pipes and cables.

6.9.6 The geophysical survey undertaken identified a number of possible partial enclosures located within the Main Site (Proposed PCC Site). Construction of the Proposed PCC Site would result in permanent ground disturbance due to ground levelling, piling and installation of below ground structures and pipework.

This could result in assets being destroyed, resulting in an effect that would be classified as **significant**.

6.9.7 Mitigation would either comprise preservation in situ (where reasonably practicable to avoid assets through detailed design) or if this is not reasonably practicable, excavation would provide mitigation in the form of preservation by record. Further stages of archaeological evaluation are proposed to determine the final mitigation strategy. The mitigation measures which will be controlled by the Outline Written Scheme of Investigation (OWSI) (**Application Document Ref. 7.4**) secured by a Requirement of the draft DCO (**Application Document Ref. 2.1**) will reduce the residual effects so that they are **not significant**.

## 6.10 Socio-economics

6.10.1 An assessment has been undertaken of the potential socio-economic impacts of the Proposed Development which considers the potential effects of construction and operation of the Proposed Development

6.10.2 Economic benefits can arise directly (through employment of local people) and indirectly (e.g. during the construction phase, when contractors may be using local accommodation and other amenities). Adverse effects can also occur for example in relation to the wider implications of any demand on local services or worker accommodation. The assessment has taken into account the demographics of the area

surrounding the Proposed Development when considering the impacts which are likely to occur. The assessment is presented in **Chapter 16: Socio-economics (ES Volume I – Application Document Ref. 6.2)** and this is accompanied by **Appendix 16A: Population and Health signposting (ES Volume II – Application Document Ref. 6.3)**.

#### Likely Impacts and Effects

- 6.10.3 Based on experience of similar projects, the Proposed Development is anticipated to create an average of approximately 776 temporary construction jobs, with a peak of circa 1,300 during the construction period. The net construction employment created by the construction phase of the Proposed Development is predicted to have a major beneficial (**significant**) short-term effect in the local area through the creation of jobs directly and indirectly, and across a wide range of sectors and skills and benefits for the local economy. Although these jobs are temporary, they would provide a positive economic impact over the circa four year construction programme. The direct expenditure involved in the construction phase would lead to increased output generated in the local economy (Scunthorpe Travel to Work Area (TTWA)).
- 6.10.4 Minor disruption on the local community, businesses and amenity is expected during construction but effects of this are **not significant**.
- 6.10.5 During the Proposed Development operational phase, employment would be generated in operative, management and maintenance roles. Operation of the Proposed Development is anticipated to create up to 50 full-time operational roles. Temporary and contractor employees associated with maintenance activities would also be employed as required. These operational effects are assessed as beneficial, although, **not significant**.
- 6.10.6 There are not anticipated to be any impacts on businesses from the operation of the Proposed Development. The businesses in the area are currently located within close proximity to the existing Keadby Power Station and it is not anticipated they would experience any change from their current interaction with the wider Keadby site. The impact on local businesses would be **not significant**.
- 6.10.7 **Appendix 16A: Population and Health Signposting (ES Volume II – Application Document Ref. 6.3)** addresses the potential effects of the Proposed Development upon human health, taking into account information relating to key aspects of the other technical assessments that are relevant to human health, as well as information on potential electromagnetic field (EMF) health effects from electricity cables associated with the Proposed Development.
- 6.10.8 The assessment identifies the potential effects on the health and wellbeing of those communities in North



Lincolnshire as a consequence of the Proposed Development.

6.10.9 The Proposed Development incorporates embedded mitigation measures to avoid any significant human health effects that are described within the **ES Chapters 8 – 18** (ES Volume I – **Application Document Ref. 6.2**) and which include:

- determination of an appropriate stack height based on air quality modelling to ensure no significant adverse effects on human receptors;
- process emissions to air will comply with the ELV specified in the Environmental Permit and based on the use of Best Available Techniques;
- use of best practicable means (BPM) to be applied, as far as reasonably practicable, during construction works to minimise noise (including vibration) at neighbouring residential properties and other sensitive receptors arising from construction;
- pollution prevention measures during construction and operation; and
- use of below ground installation of electrical transmission cables to avoid effects from electromagnetic fields on humans.

6.10.10 These measures will help to ensure that impacts on the health and wellbeing of the local population, as well as construction workers and operational staff, are

**not significant.** In summary significant effects relating to population and human health are restricted to beneficial construction employment effects. No significant adverse human health effects have been identified.

## 6.11 Climate Change and Sustainability

6.11.1 The assessment presented in **Chapter 17: Climate Change and Sustainability** (ES Volume I – **Application Document Ref. 6.3**) addresses the potential effects of the Proposed Development on climate change and considers the potential impact of future climate change on the Proposed Development and the surrounding environment. The assessment addresses three separate aspects:

- lifecycle greenhouse gas (GHG) impact assessment;
- in-combination climate change impact (ICCI) assessment; and
- climate change resilience (CCR) assessment.

6.11.2 **Appendix 17A: Sustainability Review** (ES Volume II – **Application Document Ref. 6.3**) accompanies the chapter and includes an assessment of the Proposed Development during its operational phase against a number of key sustainability themes.

### Likely Impacts and Effects

6.11.3 The receptor for the GHG assessment is the global climate. The UK's carbon budgets are used as a proxy to assess the impacts to this receptor.

6.11.4 Emissions associated with the Proposed Development have been examined for their significance against the UK Carbon Budgets for the ES. However, the Proposed Development is a low carbon generating station designed to be capable of capturing over 90% of the carbon that would otherwise be emitted. It has been concluded that the magnitude of impact of the Proposed Development is considered 'low' i.e. GHG emissions would amount to less than 1% of the current UK carbon budgets. The overall significance of effect is considered **not significant** and therefore the operations of the Proposed Development are not expected to affect the UK in meeting its current Carbon Budgets.

6.11.5 The ICCI assessment considers the existing and projected future climate conditions for the geographical location and assessment timeframe. It identifies the extent to which identified receptors in the surrounding environment are potentially vulnerable to and affected by these factors.

6.11.6 Factors considered as part of the assessment include:

- extreme weather;
- rainfall change;

- temperature and humidity;
- sea level rise;
- sea temperature; and
- wind.

6.11.7 No potential ICCI impacts or effects during construction, operation or decommissioning of the Proposed Development have been identified and effects are therefore assessed as **not significant**.

6.11.8 The potential impacts and effects of projections for climate change to the Proposed Development have been assessed and resilience measures assumed to be built into the design taken into account. These include use of Sustainable Drainage Systems (SuDS) to mitigate flood risk. The embedded design measures are sufficient to reduce the likelihood or consequence of an impact occurring as a result of projected climate hazards. As such, no significant resilience risks have been identified and effects are therefore assessed as **not significant**.

## **6.12 Major Accidents and Disasters**

6.12.1 **Chapter 18: Major Accidents and Disasters** (ES Volume I – **Application Document Ref. 6.2**) presents the assessment of major accidents and disasters (MA&D) that have the potential to arise during the construction and operation of the Proposed Development. The assessment considers the

vulnerability of the Proposed Development to existing hazards and assesses the potential for the Proposed Development to cause significant environmental effects as a result of a major accident.

- 6.12.2 Major accidents are incidents such as fires and explosions that could result in serious harm to people. They also have the potential to cause widespread damage to property and the environment. Disasters can be naturally occurring events, such as earthquakes, landslides and flooding.

#### Likely Impacts and Effects

- 6.12.3 A number of hypothetical MA&D scenarios were identified for the Proposed Development which could have significant consequences to people and the environment, but at a very low probability of occurrence.
- 6.12.4 The engineering design, construction and operation of the Proposed Development will incorporate appropriate standards and mitigation measures necessary to reduce the risks of MA&D to an acceptable level, i.e. as low as is reasonably practicable (ALARP), which is the standard expected by the regulatory authorities (Health and Safety Executive (HSE) and Environment Agency). As well as an Environmental Permit, if appropriate, the operational plant will be regulated under a Control of Major Accident Hazards (COMAH) Licence regulated by the HSE.

- 6.12.5 It is anticipated that through implementation of appropriate mitigation measures to reduce risks to ALARP (described in **Chapter 18: Major Accidents and Disasters** (ES Volume I), residual effects on sensitive receptors are not considered likely and effects are therefore assessed as **not significant**.

### **6.13 Cumulative and Combined Effects**

- 6.13.1 The purpose of **Chapter 19: Cumulative and Combined Effects** (ES Volume I – **Application Document Ref. 6.3**) is to provide an assessment of the potential for cumulative and combined effects to occur as a result of the Proposed Development being built and operated at the same time as other committed developments.
- 6.13.2 A number of other proposed developments that are also likely to be constructed and operated in future, and that have the potential to generate cumulative environmental effects together with the Proposed Development have been identified. These include (but are not limited to) the construction and operation of the proposed Humber Low Carbon Pipeline by National Grid Carbon which the Proposed Development will connect to, but which will be separately consented as a Nationally Significant Infrastructure Project (NSIP) in its own right. This development, and a further NSIP – the North Lincolnshire Green Energy Park at Flixborough have been scoped into the cumulative effects assessment.

- 6.13.3 The potential for cumulative effects with these other developments has been considered for all of the environmental topics by a review of the available information (including published environmental information where available). Both NSIP are at very early (pre-Scoping) and early (Scoping) stages and therefore the potential for cumulative effects to arise from one or both of these developments in combination with the Proposed Development has been assessed qualitatively. The assessment has concluded that based on currently available information, significant cumulative effects are unlikely. However, given the timing of these other developments, the onus will be on the respective NSIP applicants to consider any potentially significant combined effects taking into account information in this ES which will be in the public domain.
- 6.13.4 The assessment of combined effects has considered the potential for the effects of minor significance and above, identified within each of the technical assessments reported within **Chapters 8 to 18** (ES Volume I – **Application Document Ref. 6.2**) to interact and combine to affect common receptors, and has concluded that there would be no new significant combined effects during either construction or operation of the Proposed Development.

## 7.0 SUMMARY AND CONCLUSIONS

- 7.1.1 The ES presents the findings of the EIA process that has been undertaken for the Proposed Development and includes an assessment of the potential environmental impacts and effects of the Proposed Development during construction, commissioning, operation (including maintenance) and decommissioning phases.
- 7.1.2 Section 6.0 of this NTS and **Chapters 8-18** (ES Volume I – **Application Document Ref. 6.2**) have considered the potential environmental impacts and effects of the Proposed Development, including the identification of potential adverse and beneficial environmental effects that are considered significant both before, and after mitigation and enhancement measures are taken into account. The assessment has been undertaken following Rochdale Envelope principles where worst-case assumptions have been used for any aspects where the final design selection cannot yet be made and flexibility must be retained.
- 7.1.3 A range of environmental impact avoidance, design and mitigation measures have been identified to mitigate and control environmental effects during construction, operation and decommissioning phases of the Proposed Development. These will be secured through appropriate requirements within the DCO (**Application Document Ref. 2.1**) for the Proposed

Development. Additional controls will be applied through other legislative requirements including an Environmental Permit and, if required, a COMAH Licence for the operation of the Proposed Development.

- 7.1.4 **Chapter 20:** Summary of Likely Significant Residual Effects (ES Volume I – **Application Document Ref. 6.2**) indicates that likely significant residual effects of the Proposed Development include:

- a moderate adverse visual amenity effect during Proposed Development construction, operation and decommissioning on Viewpoint 1 (Chapel Lane West, Keadby), Viewpoint 2 (Gate Keepers Residence, Vazon Bridge, Keadby) and Viewpoint 4 (PRoW KEAD9 and KEAD10), north of Keadby due to the introduction of built structures against the skyline, making them more prominent and extending the amount of view which includes large scale development. Mitigation opportunities are limited due to the size and scale of the Proposed Development. An integrated design approach that considers massing and placing of taller structures to minimise potential effects has the potential to reduce visual impacts; and
- a significant beneficial effect related to direct and indirect employment created by the construction phase of the Proposed Development on the local economy.

## 8.0 REFERENCES

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