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5.0 CONSTRUCTION PROGRAMME AND MANAGEMENT

5.1 Introduction

5.1.1 This chapter provides a summary of the proposed approach for the construction phase of the Proposed Development.

5.1.2 This includes information on the anticipated construction programme, timings and methods of working, where available. At this stage, a detailed construction programme is not available, as this is normally determined by the Engineering, Procurement and Construction (EPC) contractor who has not yet been appointed. Where construction details cannot be confirmed at this stage, worst-case estimates have been made based on experience gained on similar developments and professional judgment.

5.2 Construction Timing and Programme

5.2.1 The Applicant would appoint one or more contractors for the construction of the Proposed Development. The Applicant is committed to ensuring a safe working environment for all employees and contractors.

5.2.2 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 3 2022 when it is anticipated the consent would be granted. Construction activities are expected to be completed within three years, followed by commissioning. Table 5.1 shows an indicative three-year construction programme.

Table 5.1: Indicative three-year construction programme

	YEAR 1				YEAR 2				YEAR 3				YEAR 4			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Site Preparation	■	■	■	■												
Main civil works				■	■	■	■	■								
Plant installation					■	■	■	■	■	■	■	■				
Gas and electrical connections									■	■	■	■				
Commissioning													→			

5.2.3 Due to uncertainties in the market and Government investment decisions in CCS, it is proposed that the DCO Application would be made on the basis that commencement of development can take place for up to seven years from the granting of consent. For this reason, a scenario where construction commences later in the programme, up to 2029 (seven years after the DCO could be granted) has also been considered as a reasonable worst-case for some technical assessments.

5.3 Construction Methods

Earthworks

- 5.3.1 Earthworks will be required to re-profile the Proposed Development Site, to produce a level platform, excavate foundations and/ or remove surplus material or remediate contaminated soils. As far as reasonably practicable, a material cut and fill balance would be used to minimise waste arisings. However, given the anticipated ground conditions (subject to a proposed initial ground investigation), it is anticipated that some import/ export of materials will also be necessary to provide a suitable foundation platform for the Proposed Development Site.
- 5.3.2 A number of potential scenarios have been considered in order to provide an estimate of soil movements, on which the assessments for technical disciplines in the PEI Report (e.g. traffic and transport) can be based. Of these, the worst-case assumption is that up to 65,000m³ of soils may need to be removed and up to 130,000m³ of soils imported to provide a suitable platform for foundations and buildings/ equipment across the Proposed PCC Site.
- 5.3.3 Earthworks would be undertaken at an early stage in site preparation. Further information on traffic movements is included in paragraph 5.3.36 below.
- 5.3.4 Any excess spoil generated during construction will be managed through the Site Waste Management Plan (SWMP) that would form part of the final Construction Environmental Management Plan (CEMP). Measures to control earthworks will be described in a framework CEMP which will accompany the ES and the DCO Application. The submission, approval and implementation of the final CEMP will be secured by a requirement of the DCO.
- 5.3.5 Impacts relating to the handling, movement and temporary storage of soils, including those agricultural soils classified as 'best and most versatile – ALC Grade 1) that will be disturbed for temporary laydown, will be controlled through the CEMP. Measures within the CEMP would include a pre-construction condition survey of laydown areas with ALC Grade 1 (including soil depths and textures of soil horizons), a method statement for the works to include soil handling and storage proposals, a restoration specification and a post-works survey to confirm condition. All soils will be managed in accordance with the Defra Construction Code of Practice for the Sustainable Use of Soil on Development Sites (Defra, 2009) to minimise impacts on soil structure and quality. Temporary drainage systems will be designed to provide suitable protection measures for watercourses including a suitable stand off distance. The Framework CEMP will outline measures to be put in place to prevent sediment being washed off stockpiles or off-site.
- 5.3.6 Additionally, the Framework CEMP will incorporate measures to prevent an increase in flood risk during the construction works. For example, topsoil and other construction materials will be stored outside of the 1 in 100-year (1% AEP) floodplain (Flood Zone 3) extent as far as reasonably practicable and only moved to the temporary works area immediately prior to use.

Construction Laydown Areas and Contractor's Compound

- 5.3.7 Throughout the on-going design process, consideration has been given to a range of construction laydown options. These decisions have, where relevant, been informed by on-going environmental appraisal and assessment work and by consultation with stakeholders.
- 5.3.8 Laydown areas required will depend upon the final choice of technology and EPC Contractor. At this stage, laydown requirements have been estimated using conservative assumptions to ensure that the areas assessed in this PEI Report represent a worst-case.
- 5.3.9 **Figure 3.2** (PEI Report Volume III) shows the indicative areas of land that are under consideration for construction laydown and contractors' compound(s). Approximately 17.7ha of construction laydown is required for materials and plant storage and laydown areas; field based fabrication and erection of components on-site, siting of concrete batching facilities; vehicle and cycle parking facilities; and construction offices and construction staff welfare facilities. Subject to final selection, the construction laydown area(s) would be secured by security fencing and gates as appropriate.
- 5.3.10 The area(s) would be levelled to provide an even surface and underlain by semi-permeable surfacing, such that it allows surface water and rainwater to percolate through it. No hazardous materials would be stored unbunded within the construction laydown area(s).

Preliminary Works

- 5.3.11 The preliminary works required are the subject of on-going studies and would be confirmed in the ES that accompanies the Application but are likely to include:
- erection of site fencing and notices;
 - environmental surveys and ground investigations including remedial work, if required;
 - earthworks and site clearance; and
 - diversion and laying of services.

Main Civil and Process Works

- 5.3.12 The contractor will prepare and level the Proposed PCC Site, followed by piling (if required) and excavation for main foundations, e.g. absorber stack, HRSG and turbine hall.
- 5.3.13 If piling is required, this would be subject to a piling and penetrative foundation design method statement, informed by a risk assessment. This would be secured by a Requirement of the draft DCO and submitted to, and after consultation with the Environment Agency, subject to the approval by the local authority. All piling and penetrative foundation works would require to be carried out in accordance with the approved method statement to prevent contamination of the underlying soils and groundwater.

5.3.14 Plant and equipment will be pre-fabricated where practicable, however, it is anticipated that larger equipment may need to be fabricated and erected on-site due to its anticipated size. The main items that could require special consideration due to their size or weight comprise:

- flue gas blowers;
- direct contact cooler (DCC);
- absorber column;
- stripper column and drum;
- CO₂ compressor and drying package;
- storage tanks;
- flue gas dampers; and
- major transformers and associated electrical equipment.

5.3.15 Once the buildings are erected the contractor will commence the erection of plant, e.g. turbine hall crane(s), gas turbine, generator, steam turbine, HRSG, stack etc.

Construction of Gas Connection and Above Ground Installation

5.3.16 A new gas connection pipeline would link into Keadby Power Station's existing gas supply infrastructure as outlined previously. A minimum offtake connection (MOC) from National Grid's existing high pressure gas pipeline '7 Feeder Eastoft' would be made at a location within the Proposed PCC Site. Stripping of topsoil, excavation and laying of a concrete pad and support would be undertaken followed by excavation works for the pipeline, which would extend into the new gas receiving area. This will involve excavation of a trench, soil storage, laying pipe in the trench, backfilling and re-instating soils.

5.3.17 Where the pipeline is installed below ground, it would likely be constructed using an open cut method at circa 1.2m below ground level (bgl), whereby the spoil would be excavated from the pipeline route and stored adjacent to it, while the pipeline is laid, before being reinstated.

5.3.18 Construction of the National Grid and Applicant's AGI will involve excavations and connections, installation of valves and pipework, electrical and telemetry equipment and a Pipeline Inline Gauging (PIG) trap. Following installation of below ground infrastructure, the area will be backfilled.

Construction of Water Connection Corridors

5.3.19 The Water Connection Corridor abstraction options and discharge point are at or adjacent to the existing Keadby Power Station cooling water abstraction and discharge points on the River Trent and alternatively on the Stainforth and Keadby Canal adjacent to the Keadby 2 abstraction point.

5.3.20 Should the Canal Water Abstraction option be selected, at the cooling water abstraction point, a temporary cofferdam would be installed within the canal in order to allow installation of a new abstraction structure to safely take place adjacent to the

Keadby 2 abstraction structure. This would include a concrete apron extending from the bank of the canal and equipment to meet the requirements of the Eels (England and Wales) Regulations 2009.

- 5.3.21 Should the River Water Abstraction option be chosen, the existing pipework and associated infrastructure in the River (in use for Keadby 1 Power Station) is likely to need to be upgraded or replaced as part of the Proposed Development, due to its age and condition and to enable compliance with the Eels (England and Wales) Regulations 2009. In order to undertake works safely, a temporary cofferdam would extend into the river in order to allow installation of a new abstraction structure which would include a concrete apron extending from the bank of the river.
- 5.3.22 Whichever abstraction option is selected, a pipeline would be constructed using open cut methods from the intake into the Proposed PCC Site. If the River Water Abstraction option is selected, some of the existing pipework may be able to be re-used but this will need to be extended to the PCC Site. An initial assessment of the potential environmental impacts of the cofferdam(s) due to noise and vibration, and on marine ecology, flood risk, water quality, erosion and scour impacts are presented in **Chapter 9: Noise and Vibration**, **Chapter 11: Biodiversity and Nature Conservation** and **Chapter 12: Flood Risk and Water Resources**. Measures to minimise environmental effects are reported in these chapters and will be further considered in the ES that accompanies the DCO Application.
- 5.3.23 The Applicant is proposing to re-use existing assets and pipework for Keadby 1 Power Station for the discharge of treated effluent to the River Trent. A Water Discharge Corridor is included in the Proposed Development Site comprising the easement of the existing cooling water corridor north-east from Keadby 1 Power Station, connecting with the River Trent. Interconnecting pipework would extend from Proposed PCC Site to connect to this infrastructure. As part of refurbishment and/ or replacement works within the Water Discharge Corridor, various ancillary works may be required.
- 5.3.24 In addition to cooling water connections, a connection would also be made to the Proposed Development Site from the existing potable water supply to Keadby 2 Power Station.

Construction Staff

- 5.3.25 It is assumed that the construction workforce would peak at circa 1,300 personnel per day. This figure is based on experience of other similar developments and informs the transport assessment (**Chapter 10: Traffic and Transport** and **Appendix 10A: Transport Assessment (PEI Report Volume II)**). The peak of construction activity is anticipated between months 20 to 21 of a three year construction programme.
- 5.3.26 Construction staff are anticipated to travel to the Proposed Development Site via the existing trunk road and local networks. The Applicant would seek to maximise sustainable transport options such as public transport, cycling and car sharing in accordance with its current practice/ policy. This will be outlined in the Framework Construction Workers' Travel Plan (CWTP) which will accompany the DCO Application and be secured through a Requirement in the DCO.

Construction Working Hours

- 5.3.27 Core construction working hours would be 07:00 and 19:00 Monday to Friday and 08:00 and 13:00 on Saturdays. However, it is likely that some construction activities may need to be undertaken outside of these core working hours. This is partly because certain construction activities cannot be stopped, such as concrete pouring, but also to manage the construction programme. Where on-site works are to be conducted outside the core hours, they would comply with any restrictions agreed with the local planning authority, in particular regarding control of noise and traffic in accordance with the relevant requirements which would be secured by the draft DCO. Any such works will be minimised and will be carefully managed to reduce effects on local people.
- 5.3.28 24-hour working for certain activities has therefore been assessed in **Chapter 9: Noise and Vibration** which sets out specific mitigation and control measures required to prevent disturbance from any activities outside of core working hours.

Construction Traffic and Site Access

- 5.3.29 Access to the Proposed Development Site during construction would be via the existing road access road from the A18. This access road passes over the Stainforth and Keadby Canal and the Scunthorpe to Doncaster rail line via Pilfrey Bridge (refer to **Figure 3.2** in PEI Report Volume III). It then links to Bonnyhale Road and onwards towards to the Proposed Development Site along existing private access roads. This access road is a purpose built road that serves the existing Keadby Windfarm and is used by all construction traffic for the Keadby 2 Power Station construction project. It is wide enough to allow access by construction traffic, without the need for alteration.
- 5.3.30 As the existing access road is also the Applicant's preferred permanent access to the Proposed Development Site, it is envisaged that improvement works to this existing route, including strengthening and/or replacement of the temporary steel bridge (Mabey Bridge) crossing over Hatfield Waste Drain would be required.
- 5.3.31 Subject to ongoing feasibility assessments, junction improvements at the A18 junction with the access road may be undertaken. Works may include carriageway widening along the north and/ or south of the existing carriageway alignment. Associated land is therefore included in the indicative Order Limits (refer to **Figure 3.2** in PEI Report Volume III) and the assessments presented in **Chapters 8 – 18** of this PEI Report take such works into account.
- 5.3.32 Depending on the construction laydown area(s) selected, it may be necessary to construct new temporary access points into the laydown area(s) from this existing site access road. Existing farm crossings will be utilised and upgraded where this is reasonably practicable.
- 5.3.33 Abnormal Indivisible Loads (AIL) which arrive at the Waterborne Transport Off-Loading Area would be offloaded using existing lifting equipment. The load bearing capacity of the wharf and crane pads has recently been upgraded to facilitate the delivery of AIL for the Keadby 2 Power Station construction.
- 5.3.34 AIL would enter the Proposed Development Site via the Additional AIL Route. This route is currently being used in the construction of Keadby 2 Power Station as a temporary AIL haul route but will be reinstated after completion of that construction

work, so will need to be redeveloped as a construction haul route for use by the Proposed Development.

- 5.3.35 ALL could also utilise the route from Ealand village via the A161, New Trent Road and Bonnyhale Road which has consent for up to 10 ALL to be brought through the village during construction of Keadby 2 Power Station. As this is already an established route and no works are required for the purposes of the Proposed Development, this route is not included within the indicative order limits for the Application.
- 5.3.36 The volume of construction heavy goods vehicles (HGVs) on the network is predicted to be at its maximum of around 624 two-way daily vehicle movements (312 in and 312 out) at the start of the construction period during Months 1 and 2. This is associated with the potential cut and fill of the top layer of ground within the Main Development Area for geotechnical purposes. During the remainder of the construction period, HGV movements will vary with 120 two-way daily vehicle movements (60 in and 60 out) from month 18 to month 29 of construction and 60 two-way vehicle movements for the remainder of the construction period. Further information on traffic volumes is provided in **Appendix 10A: Transport Assessment** (PEI Report Volume II).

Storage of Construction Plant and Materials

- 5.3.37 At the end of each shift, mobile plant would either be returned to a secure overnight plant storage area or have appropriate drip trays positioned, if needed.
- 5.3.38 Storage areas for hazardous or potentially polluting materials would be located in a separate, where appropriate bunded and secure area. Material data sheets would be available for all these materials and the Control of Substances Hazardous to Health (COSHH) assessments kept within the relevant risk assessment for the task.

Lighting

- 5.3.39 Construction lighting will be required in areas where natural lighting is unable to reach (sheltered/ confined areas) and prior to permanent lighting being installed. Lighting may also be required around the Proposed Development Site for night-time construction and during core working hours within winter months.
- 5.3.40 Artificial lighting would be provided to maintain sufficient security and health and safety for the Site. A Lighting Strategy will be prepared to accompany the DCO Application which outlines measures proposed to avoid excessive glare and minimise spill of light to nearby receptors (including ecology and residents) outside of the Proposed Development Site as far as reasonably practicable.
- 5.3.41 The Framework CEMP will also set out standard best practice measures to minimise light spill including glare during construction. The contractor CEMP would be required to take these into account.

Construction Environmental Management Plan (CEMP) and Site Waste Management Plan (SWMP)

- 5.3.42 In accordance with policy requirements, through the on-going design, the Applicant would seek to ensure that the Proposed Development is designed, constructed and

implemented to minimise the creation of waste, maximise the use of recycled materials and assist the collection, separation, sorting, recycling and recovery of waste arisings, as far as reasonably practicable.

5.3.43 The Applicant would require the contractor to produce and maintain a CEMP to control construction activities to minimise, as far as reasonably practicable, impacts on the environment. This would include industry best practice measures and specific measures set out in this PEI Report. A Framework CEMP will be produced in support of the Application and will set out the key measures to be employed during construction of the Proposed Development to control and minimise impacts on the environment. It will describe how monitoring and auditing activities would be undertaken, in order to ensure that mitigation, management and monitoring measures are carried out and are effective. A Requirement of the DCO would ensure that the contractor's CEMP must be in accordance with the principles set out in the Framework CEMP and would specify, as a minimum:

- a code of construction practice, specifying measures designed to minimise the impacts of construction works;
- a scheme for the control of any emissions to air;
- a soil management plan, including in relation to those soils classified as Grade 1 (excellent quality) within temporary laydown areas;
- a sediment control plan;
- a scheme for environmental monitoring and reporting during the construction of the Proposed Development, including measures for undertaking any corrective actions; and
- a notification scheme for any significant construction impacts on local residents and for handling any complaints received from local residents relating to construction impacts.

5.3.44 In order to manage and monitor waste, including any spoil generated on-site, a Framework SWMP will be developed and submitted as part of the Framework CEMP with the Application setting out how waste streams would need to be estimated and monitored and goals set with regards to the waste produced. The contractor's CEMP would be required to incorporate the principles of the Framework SWMP as appropriate.

5.3.45 The Applicant would require that the contractor segregates the waste streams on-site, prior to them being taken to a waste facility for recycling or disposal. All waste removal from Proposed Development Site would be undertaken by licensed waste carriers and taken to licensed waste facilities.

5.3.46 Further assessment of impacts in relation to construction and operational waste is presented in **Chapter 17: Climate Change and Sustainability**.

Commissioning

5.3.47 Commissioning of the Proposed Development would include testing and commissioning of the process equipment in order to ensure that that all systems and components installed are in accordance with the requirements of the Applicant.

5.4 References

Defra (2009). *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*. London: Department for Environment, Food and Rural Affairs.

Her Majesty's Stationary Office: The Eels (England and Wales) Regulations 2009.