KEADBY
NEXT GENERATION
POWER STATION
Hydrogen-enabled flexible power

A collaboration between SSE Thermal and Equinor

The Keadby Next Generation Power Station Project

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The Keadby Next Generation Power Station Development Consent Order [year]

Environmental Statement (ES)

Volume II – Appendix 18A Climate Change Risk Assessment

The Planning Act 2008

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

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Glossary of Abbreviations and Definitions of Frequently Used Terms

Abbreviation/	Description
ALARP	As Low as Reasonably Practicable
BAT	Best Available Techniques
CEMP	Construction Environmental Management Plan
CCRA	Climate Change Risk Assessment
DCO	Development Consent Order
DEMP	Decommissioning Environmental Management Plan
DESNZ	Department for Energy Security and Net Zero
EIA	Environmental Impact Assessment
ES	Environmental Statement
IEMA	Institute of Environmental Management and Assessment
IPCC	Intergovernmental Panel on Climate Change
NPS	National Policy Statement
RCP	Representative Concentration Pathways
UKCP	United Kingdom Climate Projections
UK Met Office	United Kingdom Meteorological Office

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18A. Introduction

18A.1 Overview

18A.1.1 This appendix presents the results of the Climate Change Risk Assessment (CCRA) for the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the form of a Climate Change Risk Assessment table. It should be read in conjunction with **ES Volume I Chapter 18:** Climate Change (**Application Document Ref. 6.2**).

18A.1.1 The time-period for the initial risk rating of each phase of the Proposed Development reflects the period of the obtained climate change projection data (e.g. projections for 2020-2049 cover the estimated construction phase of 2026-2030).

18A.2 Legislation, Policy and Guidance

Legislation

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

18A.2.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017: Section 5(2) and Schedule 4, paragraphs 4 and 5 sets out that an EIA should describe and assess (in an appropriate manner and in light of each individual case) the direct and indirect significant effects of the Proposed Development on the climate.

Policy

National Planning Statements

18A.2.1 National Planning Statements (NPSs) set out the UK government's key objectives, policies and considerations to inform planning decisions. Use of the NPSs for decision making ensures that development of major infrastructure projects aligns with national priorities relating to sustainability, economic growth, and environmental protection,

including the government position on the mitigation of, and adaptation to, climate change.

Overarching National Planning Statement for Energy (NPS EN-1) (DESNZ, 2023)

18A.2.1 The Overarching NPS EN-1 is of particular relevance to the Proposed Development. Specifically, it contains the following:

- Paragraphs 4.6.13 and 4.10.9 in relation to climate impacts and adaptation;
- Paragraphs 4.1.3 to 4.1.4 in relation to the presumption in favour of granting consent for energy NSIPs; and
- Paragraphs 4.10.3 and 5.8.5 in relation to climate projections, flood risk and the importance of relevant mitigation.

National Policy Statement for Electricity Networks Infrastructure (NPS EN-5) (November 2023) (DESNZ, 2023d)

18A.2.1 The NPS EN-5 is of relevance to the Proposed Development. Particularly in reference to the following:

- Section 2.3 regarding NPS EN-1 (November 2023) and the importance of climate change adaptation and resilience.

The National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2023)

18A.2.1 The revised National Planning Policy Framework sets out the government's planning policies for England. While the NPPF does not set specific policies for Nationally Significant Infrastructure Projects (NSIPs), its policies may be of relevance to decision making.

18A.2.1 Those policies of relevance to the climate change assessment include those achieving sustainable development and meeting the challenge of moving to a low carbon economy, climate change, flooding and coastal change. The NPPF states that the planning system should support this transition by supporting low carbon energy and associated infrastructure.

18A.2.1 The sections of the framework particularly relevant to the Proposed Development are: Paragraphs 161 to 169 in relation to climate projections, associated flood risk and adaptation.

National Planning Policy Guidance on Climate Change

18A.2.1 Guidance published by the Ministry of Housing, Communities and Local Government (2019b) describes how to identify suitable mitigation and

climate adaptation measures to incorporate into the planning process, stating that "*Effective spatial planning is an important part of a successful response to climate change as it can influence the emission of greenhouse gases… Planning can also help increase resilience to climate change impact through the location, mix and design of development.*"

Local Planning Policy and Strategy

18A.2.1 The North Lincolnshire Local Development Framework (North Lincolnshire Council, 2011) sets out the council's spatial vision, strategy and policies to deliver the strategy up to 2026. The Core Strategy covers several policies related to climate change, including the following, which have been considered in the assessment:

- Policy CS16 North Lincolnshire Landscape, Greenspace and Waterscape;
- Policy CS17 Biodiversity;
- Policy CS18 Sustainable Resource Use and Climate Change;
- Policy CS19 Flood Risk; and
- Policy CS20 Sustainable Waste Management.

18A.2.1 The North Lincolnshire Carbon Management Strategy (North Lincolnshire Council, 2017) states that this area is one of the top five most vulnerable coasts in the UK, as illustrated by Plate 18A.1, below,

that illustrates the potential area of flooding by 2100 with a 1m sea level rise.

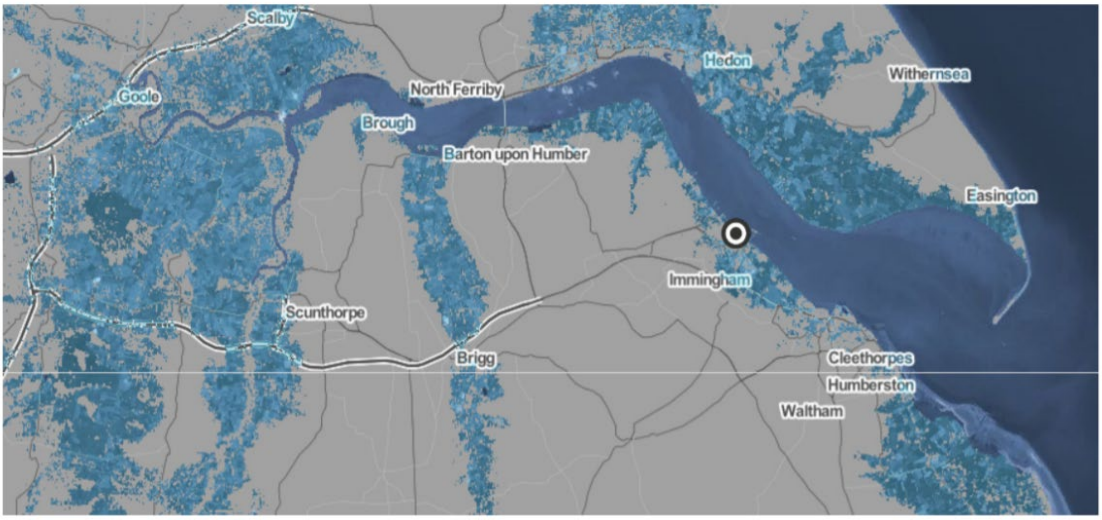

Plate 18A.1: Potential Areas of Flooding (2100)

Guidance

EC Non-paper Guidelines for Project Managers: Making Vulnerable Investments Climate Resilient

18A.2.1 These guidelines aim to help developers of physical assets and infrastructure incorporate resilience to current climate variability and future climate change within their projects (EU Commission, 2011). Although the UK is no longer a Member State of the EU, this guidance is still considered relevant in the context of EIAs undertaken in respect of developments in the UK.

IEMA: Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation.

18A.2.1 The IEMA Guidance for assessing climate change resilience and adaptation in EIA (2020) has also been followed. It provides guidance for consideration of the impacts of climate change within project design. The guidance sets out how to:

- define climate change concerns and environmental receptors vulnerable to climate factors;
- define the environmental baseline with changing future climate parameters; and

- determine the resilience of project design and define appropriate mitigation measures to increase resilience to climate change.

18A.2.1 This guidance is used within the climate change resilience methodology, as described in Section 18A.3.

18A.3 Methodology

Overview

18A.3.1 This section sets out the scope and methodology for the preliminary assessment of the climate change risks on the Proposed Development.

Study Area

18A.3.1 The Study Area for the CCRA is the area within the Site Boundary, i.e. it covers the construction, operation, maintenance and decommissioning of all assets and infrastructure which constitute the Proposed Development.

Sources of information

18A.3.1 Historical climate data obtained from the Met Office website (UK Met Office, 2024a) has been used to determine the current baseline conditions for the Doncaster region.

18A.3.1 In line with paragraphs 4.10.13 and 4.10.17 of updated NPS EN-1 (which came into force in January 2024) which require use of the latest credible scientific evidence in relation to climate change, the UK Climate Projections 2018 (UKCP18) (UK Met Office, 2024b) data was obtained to determine the future baseline conditions.

18A.3.1 The IPCC AR6 Sea Level Projection Tool (IPCC, 2021) and Thinkhazard (UN, 2023) were also used for other projected trends/impacts, and the UK Climate Change Risk Assessment were analysed (per the direction in Paragraph 4.10.17 of NPS EN-1 (November 2023)) for the current state of nationwide climate change risks (DESNZ, 2023).

18A.3.1 Climate change resilience measures that have been built into the Proposed Development design were determined through liaison with

the Applicant's design team and relevant environmental discipline leads and are set out in the Climate Change Risk Assessment.

Methodology

18A.3.1 The EIA Regulations require the inclusion of information on the vulnerability of the Proposed Development to climate change. Consequently, the CCRA for the Proposed Development has been conducted which identifies potential climate change impacts.

18A.3.1 The CCRA has included all infrastructure and assets associated with the Proposed Development. It covers resilience against both gradual climate change, and the risks associated with an increased frequency of extreme weather events as per the UKCP18 projections.

18A.3.1 The review of potential impacts and the Proposed Development's vulnerability considers the embedded mitigation measures that have been designed into the Proposed Development, discussed in Section 5.

18A.3.1 The assessment has considered Climate Projections over a 25-year period from the Proposed Development's commissioning, assumed to be 2030.

18A.3.1 Climate parameters considered in the CCRA during the construction, operation and maintenance, and decommissioning phases of the Proposed Development include the following:

- Extreme weather events;
- Flood risk;
- Sea level rise;
- Temperature change; and
- Precipitation change.

18A.3.1 The CCRA has been undertaken for the Proposed Development to identify potential climate change impacts on the Proposed Development and associated receptors, and to consider their potential consequence and likelihood of occurrence, taking account of the adaption measures embedded into the design of the Proposed Development (Section 18A.8).

18A.3.1 Climate change projections for the Proposed Development during the construction phase have been examined against receptors.

Construction phase receptors of the Proposed Development include the workforce, plant, machinery, and materials.

18A.3.1 Heatwaves and other extreme weather events could present a risk to site workers. Climate change impacts during construction (expected to be approximately two years from 2028 to 2030) will therefore be considered in the CCRA, covering effects like heat exhaustion and exposure to dangerous weather conditions.

18A.3.1 For the operation and maintenance phase of the Proposed Development, potential climate change impacts on the Proposed Development have been identified using relevant projections from UKCP18 and the CCRA considers their potential consequence to receptors and likelihood of occurrence, taking account of the measures incorporated into the design of the Proposed Development where available. The CCRA therefore considers the impact of climate change on the Proposed Development itself including the Proposed Development's infrastructure (for example the power plant and related equipment, the workers on Site, during operation and maintenance, and refurbishment and any landscaping being undertaken as part of the Proposed Development).

18A.3.1 The following key terms and definitions relating to the CCRA have been used:

- Climate hazard – a weather or climate related event, which has potential to do harm to environmental or community receptors or assets, for example, increased winter precipitation;
- Climate change impact – an impact from a climate hazard which affects the ability of the receptor or asset to maintain its function or purpose; and
- Consequence – the level of effect on the receptor or asset resulting from the climate hazard having an impact.

18A.3.1 A stepped approach is used to assess the impacts of climate change on the Proposed Development:

- Identify potential climate hazards;
- Identify likelihood of climate impact occurring;
- Identify consequence of impact on the Proposed Development; and
- Identify significance of impact (likelihood of impact occurring x consequence of impact).

18A.3.1 Once potential climate impacts have been identified (e.g. damage to assets due to extreme heat), the likelihood of their occurrence during the construction, operation and maintenance, and decommissioning phases is categorised.

18A.3.1 The criteria which have been used to determine the likelihood of a climate change impact occurring are detailed in Tabe 18A.1. For example, a climate hazard could be a heatwave, while the climate impact is the impact on the Proposed Development, e.g. overheated electrical equipment.

Table 18A.1: Level of Likelihood of a Climate Impact Occurring

Likelihood Category	Qualitative description (frequency of occurrence)	Quantitative description (probability of occurrence)
Rare	Highly unlikely to occur	5%
Unlikely	Unlikely to occur	20%
Moderate	As likely to occur as not	50%
Likely	Likely to occur	80%
Almost certain	Very likely to occur	95%

18A.3.1 Following identification of climate impacts, their consequence has been assessed according to the scale, complexity, degree of harm and reversibility of the effect, for example, permanent damage to electrical equipment from heatwaves causing complete loss of operation. The categories and descriptions provided below are based on the IEMA climate change resilience and adaptation guidance (IEMA, 2020).

Table 18A.2: Level of Consequence of a Climate Change Impact Occurring

Risk areas	Insignificant	Minor	Moderate	Major	Catastrophic
Asset damage / Engineering / Operational	Impact can be absorbed through normal activity	An adverse event that can be absorbed by taking business continuity actions	A serious event that requires additional emergency business continuity actions	A critical event that requires extraordinary / emergency business continuity actions	Disaster with the potential to lead to shut down or collapse or loss of the asset / network
Safety and Health	First aid case	Minor injury, medical treatment	Serious injury or lost work	Major or multiple injuries, permanent injury, or disability	Single or multiple fatalities
Environment	No impact on baseline environment. Localised in the source area. No recovery required	Localised within site boundaries. Recovery measurable within one month of impact	Moderate harm with possible wider effect. Recovery in one year	Significant harm with local effect. Recovery longer than one year. Failure to comply with environmental regulations / consent	Significant harm with widespread effect. Recovery longer than one year. Limited prospect of full recovery
Social	No negative social impact	Localised, temporary social impacts	Localised, long-term social impacts	Failure to protect poor or vulnerable groups (1). National, long-term social impacts	Loss of social licence to operate. Community protests
Financial (for single extreme event or annual average impact) (**)	x % IRR (***) < 2 % of turnover	x % IRR 2 – 10% of turnover	x % IRR 10 – 25% of turnover	x % IRR 25 – 50% of turnover	x % IRR >50% of turnover
Reputation	Localised, temporary	Localised, short-term impact on	Local, long-term impact on	National, short- term impact on	National, long-term impact with potential to affect

Risk areas	Insignificant	Minor	Moderate	Major	Catastrophic
	impact on public opinion	public opinion	public opinion with adverse local media coverage	public opinion; negative national media coverage	the stability of the Government
Cultural heritage and cultural premises	Insignificant impact	Short term impact. Recovery or repair.	Serious damage with wider impact to tourism industry	Significant damage with national and international impact	Permanent loss with resulting impact on society

(1) Including groups that depend on natural resources for their income/livelihoods and cultural heritage (even if not considered poor) and groups considered poor and vulnerable (and often that have less capacity to adapt) as well as persons with disabilities and older persons.

(*) The ratings and values suggested here are illustrative. The project promoter and climate-proofing manager may choose to modify them.

(**) Example indicators – other indicators that may be used including costs of immediate / long-term emergency measures; restoration of assets; environmental restoration; indirect costs on the economy, indirect social costs.

(***) Internal Rate of Return (IRR).

Significance criteria

18A.3.1 The significance in the CCRA is determined as a function of the likelihood of a climate change impact occurring (Table 18A.1) and the consequence to the receptor if the impact occurs (18A.2). This is detailed in Table 18A.2, where N = negligible, L = Low, M = Moderate, and H = High. The significance is then detailed in Table 18A.3. The assessment takes into account confirmed design and mitigation measures (referred to as Development Design and Impact Avoidance as set out in Section 18A.5).

Table 18A.3: Significance of Effect Matrix for Climate Change Risk Assessment

Level of consequence of a climate impact occurring	Likelihood of Climate-Related Impact Occurring				
	Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Rare	Low (NS)	Low (NS)	Medium (NS)	Medium (NS)	Medium (NS)
Unlikely	Low (NS)	Low (NS)	Medium (NS)	High (S)	High (S)
Moderate	Low (NS)	Medium (NS)	High (S)	High (S)	Extreme (S)
Likely	Medium (NS)	High (S)	High (S)	Extreme (S)	Extreme (S)
Almost certain	Medium (NS)	High (S)	Extreme (S)	Extreme (S)	Extreme (S)

Note: S = significant; NS = not significant

18A.3.1 The Proposed Development's resilience to climate change will be considered qualitatively during construction, operation and maintenance, and decommissioning phases. This will be completed in liaison with the Proposed Development's design team and the other technical specialists by considering the climate projections for the geographical location and timeframe of the Proposed Development.

The assessment has been undertaken in line with IEMA guidance (IEMA, 2020) on climate change resilience.

Assessment Assumptions and Limitations

18A.3.1 The CCRA is limited by the availability of data and Proposed Development design information at the date this assessment was prepared.

18A.4 Baseline Conditions

Current Baseline

18A.4.1 The baseline for the CCRA assessment is the climate in the location of the Proposed Development for the 30-year historical period of 1981 to 2010 (the standard baseline for the UKCP18 climate change projection data). Historical climate data recorded by the closest meteorological station to the Proposed Development (Finningley, approximately 16 miles south of the Proposed Development) for the 30-year period of 1981 to 2010 was obtained from the Met Office website (UK Met Office, 2024a) and is summarised in **Table 18A.4** below.

Future Baseline

18A.4.1 The future baseline is expected to differ from the present-day baseline described above. UKCP18 (UK Met Office, 2024b) provides probabilistic Climate change projections for pre-defined 30-year periods for annual, seasonal and monthly changes to mean climatic conditions over land areas. For the purpose of the assessments, UKCP18 probabilistic projections for pre-defined 30-year periods for the following average climate variables have been obtained:

- Mean annual temperature;
- Mean summer temperature;
- Mean winter temperature;
- Mean maximum summer temperature;
- Mean minimum winter temperature
- Mean annual precipitation;
- Mean summer precipitation;
- Mean winter precipitation;
- Sea level rise; and
- Extreme weather events e.g. heat waves, storm surges etc.

18A.4.1 Projected temperature and precipitation variables presented in UKCP18 probabilistic projections have been analysed for the 25 km^2 grid square within which the Proposed Development is located. These figures are expressed as temperature/precipitation anomalies in relation to the 1981 to 2010 baseline.

18A.4.1 UKCP18 uses a wide range of possible scenarios, classified as Representative Concentration Pathways (RCPs), to model potential future emission trends and their impact on the climate. These RCPs "… specify the concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to preindustrial levels." For the purposes of this assessment, RCP8.5 has been used as a worst-case scenario, as it predicts a high-emissions or 'business-as-usual' future. It is important to note that this scenario is used to represent broader global emission trends and their potential impact on the future climate, rather than to compare directly with the emissions from the Proposed Development.

18A.4.1 As the design life of the Proposed Development is 25 years (around 2 years for construction and 25 years for operation and maintenance), the CCRA has considered a scenario that reflects a high level of GHG emissions at the 10%, 50%, and 90% probability levels up to 2079[1] to assess the impact of climate change over the assessed design life of the Proposed Development.

18A.4.1 Climate variables impacting the construction, operation and maintenance, phases of the Proposed Development have been assessed in **Table 18A.4** below against RCP8.5 2020-2049 and 2050-2079 projection data.

[1] 2079 is beyond the lifetime of the Proposed development. However, the two time periods selected for the assessment are the next two 30-year periods available. This represents a worst-case approach as climate impacts are expected to increase further into the future.

Table 18A.4: Climate Change Baseline and Projection Data

Climate Variable	Baseline (1981-2020)	Climate change projection RCP8.5 (2020-2049)	Climate change projection RCP8.5 (2050-2079)	Projected Trend	Climate Projection Source
Temperature					
Mean annual maximum temperature (°C)	14.1°C	+1.1 (+0.5 to +1.8)	+2.5 (+1.3 to +3.7)	↑	UKCP18 RCP8.5
Mean summer maximum daily temperature (°C)	21.0°C	+1.4 (+0.2 to +2.4)	+3.1 (+1.2 to +5.1)	↑	UKCP18 RCP8.5
Mean winter minimum daily temperature (°C)	3.3°C	+0.9 (+0.1 to +1.9)	+2.1 (+0.6 to +3.8)	↑	UKCP18 RCP8.5
Mean maximum daily temperature in warmest month (°C)	21.9°C (July)	-	-		UKCP18 RCP8.5
Mean minimum daily temperature in coldest month (°C)	1.0°C (February)	-	-		UKCP18 RCP8.5
Rainfall					

Climate Variable	Baseline (1981-2020)	Climate change projection RCP8.5 (2020-2049)	Climate change projection RCP8.5 (2050-2079)	Projected Trend	Climate Projection Source
Mean annual rainfall (mm)	574.45 mm	+0.8% (-4.9 % to +6.4%)	-1.0% (-7.9% to +5.7%)	↓	UKCP18 RCP8.5
Mean summer rainfall (mm)	54.96 mm	-10.0% (-30.3% to +11.7%)	-17.9% (-41.5% to +7.1%)	↓	UKCP18 RCP8.5
Mean winter rainfall (mm)	41.81 mm	+3.4% (-3.5% to +11.5%)	+9.1% (-2.3% to 22.6%)	↑	UKCP18 RCP8.5
Wettest month on average (mm)	June: 63.0 mm	-	-		UKCP18 RCP8.5
Driest month on average (mm)	February: 32.2 mm	-	-		UKCP18 RCP8.5
Other					
Sea Level rise (m)		0.12	0.34	↑	IPCC AR6 Sea Level Projection Tool SSP8.5

Climate Variable	Baseline (1981-2020)	Climate change projection RCP8.5 (2020-2049)	Climate change projection RCP8.5 (2050-2079)	Projected Trend	Climate Projection Source
Storm surges		The UKCP18 model suggest a small contribution from storm surges, however it is unclear if the frequency and severity of future storm surges is going to change.			UKCP18 RCP8.5
Heatwaves		Under a high emissions scenario, it is estimated that by the end of the 21st Century, all areas of the UK are projected to be warmer with hotter, drier summers and heatwaves likely to become more common and intense.		↑	UKCP18 RCP8.5
Wildfires		Think Hazard has classified the wildfire hazard in South Yorkshire as medium, according to currently available information. This means that there is between a 10% and 50% chance of experiencing weather that could support a hazardous wildfire that may pose risk to life and property loss in any given year.			Think Hazard
Drought		The Met Office has projected a trend towards drier summers on average, with the trend being stronger under a high GHG emission scenario compared to a low one. However, it			UKCP18 RCP8.5

Climate Variable	Baseline (1981-2020)	Climate change projection RCP8.5 (2020-2049)	Climate change projection RCP8.5 (2050-2079)	Projected Trend	Climate Projection Source
		is the distribution of rainfall throughout the seasons that will determine UK drought risk.			

18A.5 Development Design and Impact Avoidance

18A.5.1 Mitigation measures have been built into the early design stages of the Proposed Development and will be developed further ahead of the ES. Mitigation measures embedded within the Proposed Development include:

- The management of impacts and the application of mitigation/adaptation measures during Proposed Development construction will be enforced through the final Construction Environmental Management Plan which, in accordance with the draft Requirement, must be in general accordance with the Outline Construction Environmental Management Plan (**Outline CEMP**) (**Application Document 7.4**), which accompanies the Application. This includes, but is not limited to:
  - Storing topsoil a minimum of 20m from watercourses on flat lying land; and
  - Monitoring weather forecasts and receive Environment Agency flood alerts to allow works to be planned and carried out accordingly to manage extreme weather conditions such as storms and flooding.
- Drainage Strategy (included within Annex 3 of **ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document 6.3)**, including but not limited to:
  - Attenuation of surface water runoff to minimise flood risk at the Proposed Development location; and
  - Flood defence consideration and mitigation measures.

18A.6 Likely Impacts and Effects

18A.6.1 The three tables below present the climate change risks associated with each phase of the Proposed Development, from construction through operation and maintenance to decommissioning. Future climate projections have been reviewed, and the sensitivity of assets have been examined, before commenting on the adequacy of the embedded climate change mitigation measures built into the Proposed Development.

18A.6.1 Identified climate variables are given a significance rating, based upon the likelihood of an impact occurring to the Proposed Development and the anticipated consequences. This includes consideration of embedded mitigation measures.

Table 18A.5: Construction Climate Change Risk Assessment

		Risk Statement	Type of risk	Project receptors	Impact type	Planned Controls	Initial risk rating (RCP8.5 2020-49) Likelihood	Consequence	Risk rating	
1	Increase in year-round temperatures	Overheating of equipment Damage to materials	Direct	Plant and vehicles, physical structures, materials, and access routes to sites	Asset damage	During construction, the contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions.	Rare	Minor	Low	Not Significant
2	Increase in year-round temperatures	Risk of overheating to workers	Direct	Workforce	Safety and health	The Outline Construction Environmental Management Plan (**Outline CEMP**) (**Application Document Ref. 7.4**) states that construction contractors will incorporate environmental control, health and safety regulations, and align to current guidance. During construction, the contractor will monitor weather forecasts monthly, weekly, and daily, and plan works accordingly.	Rare	Minor	Low	Not Significant
3	Extreme rainfall events	Surface water flooding and standing water	Direct	Physical structures	Asset damage	The Drainage Strategy (Annex **3 of ES Volume II Appendix 12A:**Flood Risk Assessment **(Application Document Ref. 6.3)**) identifies drainage arrangements to attenuate the Proposed Development's surface water runoff and minimise flood risk to the site and surrounding areas.	Unlikely	Minor	Low	Not Significant
4	Extreme rainfall events	Working on-site in dangerous conditions	Direct	Workforce	Safety and health	The **Outline CEMP** (**Application Document Ref. 7.4**) states that construction contractors will incorporate environmental control, health and safety regulations, and align to current guidance. During construction, the contractor will monitor weather forecasts monthly, weekly, and daily, and plan works accordingly.	Rare	Minor	Low	Not Significant

	Risk Statement		Type of risk	Project receptors	Impact type	Planned Controls	Initial risk rating (RCP8.5 2020-49) Likelihood	Consequence	Risk rating	
5	Decrease in summer/ annual rainfall	Increase drought risk	Indirect	All receptors	All impact types	None required	Rare	Insignificant	Low	Not Significant
6	Increase in winter rainfall	Viability of and access to sites (such as heavy rain resulting in surface water flooding of local roads, sources of power supply, or inundation of sites)	Direct	All receptors	Safety and health, Asse damage	During construction, the contractor will monitor weather forecasts on a monthly, weekly, and daily basis, and plan works accordingly. Flood resilience measures to infrastructure are set out in **ES Volume II Appendix 12A**: Flood Risk Assessment (**Application Document Ref. 6.3**) to allow for climate change.	Rare	Insignificant	Low	Not Significant
7	Increase in heatwaves	Increased heat stress/heat exhaustion for workers	Direct	Workforce, visitors on-site.	Safety and health	During construction, the contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions.	Rare	Minor	Low	Not Significant
8	Increase in heatwaves	Overheating of electrical equipment Damage to materials	Direct	Plant and vehicles, physical structures, materials, and access routes to sites	Asset Damage	During construction, the contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions.	Unlikely	Minor	Low	Not Significant
9	Wildfire risk	Risk to workers and assets over dry periods	Direct	Workforce, physical structures	Safety and health, Asset damage	During construction, the contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions.	Rare	Minor	Low	Not Significant

		Risk Statement	Type of risk	Project receptors	Impact type	Planned Controls	Initial risk rating (RCP8.5 2020-49) Likelihood	Consequence	Risk rating	
10	Increase in storm intensity	Damage to structures/materials/equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks. May include high winds increasing dust (and other debris), storm surge and coastal erosion.	Direct	Workforce, plant and vehicles, physical structures, materials, and access routes to sites	Safety and health, Asset Damage	During construction, the contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions.	Unlikely	Minor	Low	Not Significant
11	Sea level rise	Reduced viability of and access to sites (such as flooding of local roads, sources of power supply or inundation of sites).	Direct	Plant and vehicles, physical structures, materials, and access routes to sites	Asset damage	None considered during construction.	Rare	Minor	Low	Not Significant

Table 18A.6: Operation and Maintenance Climate Change Risk Assessment

Operation and Maintenance										
Risk Identification						Risk Assessment				Significance
							Initial risk rating (RCP8.5 2020-49 — 2050-2079)			
Risk ID	Climate Variable	Risk Statement	Type of risk	Project receptors	Impact type	Planned Controls	Likelihood	Consequence	Risk rating	
1	Increase in year-round temperatures	Damage to materials and assets, including overheating of electrical equipment.	Direct	Physical structures	Asset damage	The Operation and Maintenance Managers will put in place a plan for the management and maintenance of assets following sign-off on completion of the construction works.	Unlikely	Minor	Low	Not Significant
2	Increase in year-round temperatures	Overheating of workforce in hot conditions	Direct	Workforce	Safety and health	The Operation and Maintenance Managers will put in place a plan for the management and maintenance of assets following sign-off on completion of the construction works.	Unlikely	Minor	Low	Not significant
3	Increase in summer temperature	Reduced efficiency of CCGT	Direct	Function of facility	Asset operation	The power plant is designed to operate over a large range of ambient conditions. Temperature changes would not have a noticeable impact on plant efficiency.	Rare	Insignificant	Low	Not Significant
4	Extreme rainfall events	Surface water flooding and standing water. Increased soil moisture levels leading to deterioration of structure or foundations. Damage to infrastructure through storm surge and river flooding.	Direct	Physical structures	Asset damage	The Drainage Strategy (Annex 3 **of ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)**) identifies drainage arrangements to attenuate the Proposed Development's surface water runoff and minimise flood risk to the site and surrounding areas. Flood resilience measures to infrastructure are set out in **ES Volume II Appendix 12A:**Flood Risk Assessment (**Application Document Ref. 6.3**) to allow for climate change.	Unlikely	Minor	Low	Not Significant
5	Extreme rainfall events	Working on-site in dangerous conditions	Direct	Workforce	Safety and health	The Drainage Strategy (Annex 3 **of ES Volume II Appendix 12A:**Flood Risk Assessment **(Application Document Ref. 6.3)**) identifies drainage arrangements to attenuate the Proposed Development's surface water runoff and minimise flood risk to the site and surrounding areas.	Unlikely	Minor	Low	Not Significant

Operation and Maintenance										
Risk Identification						Risk Assessment				Significance
Risk ID	Climate Variable	Risk Statement	Type of risk	Project receptors	Impact type	Planned Controls	Initial risk rating (RCP8.5 2020-49 — 2050-2079) Likelihood	Consequence	Risk rating	
						The Operation and Maintenance Managers will put in place a plan for the management and maintenance of assets following sign-off on completion of the construction works.				
6	Decrease in annual rainfall, particularly in summer.	Drought risk potentially reducing water available to the Proposed Development.	Direct	Physical structure, function of facility	Safety and Health	The Operation and Maintenance Managers will put in place a plan for the management and maintenance of assets following sign-off on completion of the construction works. Consideration of alternative sources of water e.g. from the River Trent, or from the Stainforth and Keadby Canal during times of hand-off flow. Also, implementation of a hybrid water cooling system to reduce water abstraction requirements.	Unlikely	Moderate	Medium	Not Significant
7	Increase to winter rainfall	Surface water flooding and standing waters. Deterioration of structures or foundations due to increase in soil moisture levels. Damage to building surfaces/ exposed utilities from increased drying/wetting and increase frost penetration.	Direct	All receptors	Safety and health	The Drainage Strategy (Annex 3 **of ES Volume II Appendix 12A:**Flood Risk Assessment **(Application Document Ref. 6.3)** identifies drainage arrangements to attenuate the Proposed Development's surface water runoff and minimise flood risk to the site and surrounding areas. Flood resilience measures to infrastructure are set out in **ES Volume II Appendix 12A** Flood Risk Assessment (**Application Document Ref. 6.3**) to allow for climate change.	Unlikely	Minor	Low	Not Significant
8	Increase in heatwaves	Damage to materials and assets, including overheating of electrical equipment.	Direct	Physical structures	Asset damage	The Operation and Maintenance Managers will put in place a plan for the management and maintenance of assets following sign-off on completion of the construction works.	Unlikely	Minor	Low	Not Significant

Operation and Maintenance										
Risk Identification						Risk Assessment				Significance
Risk ID	Climate Variable	Risk Statement	Type of risk	Project receptors	Impact type	Planned Controls	Initial risk rating (RCP8.5 2020-49 — 2050-2079) Likelihood	Consequence	Risk rating	
9	Increase in heatwaves	Overheating of workforce in hot conditions.	Direct	Workforce	Safety and health	The Operation and Maintenance Managers will put in place a plan for the management and maintenance of assets following sign-off on completion of the construction works.	Rare	Minor	Low	Not Significant
10	Increased wildfire risk	Potential danger for assets to cause or be damaged by wildfire	Direct	Physical structures	Safety, asset damage	The Operation and Maintenance Managers will put in place a plan for the management and maintenance of assets following sign-off on completion of the construction works.	Rare	Moderate	Medium	Not Significant
11	Increase in storm intensity	Surface water flooding and standing water. Increased soil moisture levels leading to deterioration of structure or foundations. Damage to infrastructure through storm surge and river flooding.	Direct	Built terrestrial assets, staff facilities and access	Asset damage	The Drainage Strategy (Annex 3 **of ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)**) identifies drainage arrangements to attenuate the Proposed Development's surface water runoff and minimise flood risk to the site and surrounding areas. Flood resilience measures to infrastructure are set out in **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3.** to allow for climate change.	Unlikely	Minor	Low	Not Significant
12	Sea level rise	Surface water flooding and standing waters. Deterioration of structures or foundations due to increase in soil moisture levels. Damage to infrastructure through storm surge and river flooding. Damage to building surfaces/ exposed utilities from increased	Direct	Built terrestrial assets, staff facilities and access	Asset damage	The Drainage Strategy (Annex 3 **of ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)**) identifies drainage arrangements to attenuate the Proposed Development's surface water runoff and minimise flood risk to the site and surrounding areas. Flood resilience measures to infrastructure are set out in **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**) to allow for climate change.	Unlikely	Moderate	Medium	Not Significant

Operation and Maintenance											
Risk Identification						Risk Assessment				Significance	
Risk ID	Climate Variable	Risk Statement	Type of risk	Project receptors	Impact type	Planned Controls	Initial risk rating (RCP8.5 2020-49 — 2050-2079)				
							Likelihood	Consequence	Risk rating		
		drying/wetting and increase frost penetration									

Table 18A.7: Decommissioning Climate Change Risk Assessment

Decommissioning										
Risk ID	Climate Variable	Risk Identification				Risk Assessment				Significance
		Risk Statement	Type of risk	Project receptors	Impact type	Planned Controls	Initial risk rating (RCP8.5 2050-2079)			
							Likelihood	Consequence	Risk rating	
1	Increase in year-round temperatures	Overheating of equipment Damage to materials	Direct	Plant and vehicles, physical structures, materials, and access routes to sites	Asset damage	A Decommissioning Environmental Management Plan (DEMP) will be developed which will be secured through a Requirement on the **Draft DCO (Application Document Ref. 3.1)**. This will outline relevant mitigation measures.	Unlikely	Minor	Low	Not Significant
2	Increase in year-round temperatures	Overheating of workforce in hot conditions	Direct	Workforce	Safety and health	A DEMP will be developed which will be secured through a Requirement on the **Draft DCO (Application Document Ref. 3.1)**. This will outline relevant mitigation measures.	Unlikely	Minor	Low	Not Significant
3	Extreme rainfall events	Surface water flooding and standing water	Direct	Physical structures	Asset damage	The Drainage Strategy (Annex 3 **of ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)**) identifies drainage arrangements to attenuate the Proposed Development's surface water runoff and minimise flood risk to the site and surrounding areas.	Unlikely	Minor	Low	Not Significant
4	Extreme rainfall events	Working on-site in dangerous conditions	Direct	Workforce	Safety and health	The Drainage Strategy (Annex **3 of ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)**) identifies drainage arrangements to attenuate the Proposed Development's surface water runoff and minimise flood risk to the site and surrounding areas. A DEMP will be developed which will be secured through a Requirement on the **Draft DCO (Application Document Ref. 3.1)**. This will outline relevant mitigation measures.	Rare	Minor	Low	Not Significant

Decommissioning										
Risk ID	Climate Variable	Risk Identification				Risk Assessment				Significance
		Risk Statement	Type of risk	Project receptors	Impact type	Planned Controls	Initial risk rating (RCP8.5 2050-2079)			
							Likelihood	Consequence	Risk rating	
5	Decrease in annual rainfall, particularly in summer.	Drought risk potentially reducing water available to workers and decommissioning activities	Direct	Workforce	Safety and health	Consideration of alternative sources of water e.g. from the River Trent, or from the Stainforth and Keadby Canal, to reduce use of mains water.	Rare	Insignificant	Negligible	Not Significant
6	Increase to winter rainfall	Viability of and access to sites (such as heavy rain resulting in surface water flooding of local roads, sources of power supply, or inundation of sites)	Direct	All receptors	Safety and health, asset damage	The Drainage Strategy (Annex 3 **of ES Volume II Appendix 12A:**Flood Risk Assessment **(Application Document Ref. 6.3)**). identifies drainage arrangements to attenuate the Proposed Development's surface water runoff and minimise flood risk to the site and surrounding areas. A DEMP will be developed which will be secured through a Requirement on the **Draft DCO (Application Document Ref. 3.1)**. This will outline relevant mitigation measures.	Unlikely	Minor	Low	Not Significant
7	Increase in heatwaves	Increased heat stress/heat exhaustion for workers	Direct	Workforce	Safety and health	A DEMP will be developed which will be secured through a Requirement on the **Draft DCO (Application Document Ref. 3.1)**. This will outline relevant mitigation measures.	Unlikely	Minor	Low	Not Significant
8	Increase in heatwaves	Damage to structures/materials/equipment and resulting in delays to programme and associated costs and/or	Direct	Built assets, materials, staff facilities and access routes to sites	Asset damage	A DEMP will be developed which will be secured through a Requirement on the **Draft DCO (Application Document Ref. 3.1)**. This will outline relevant mitigation measures.	Unlikely	Minor	Low	Not Significant

Decommissioning											
Risk ID	Climate Variable	Risk Identification				Risk Assessment					Significance
		Risk Statement	Type of risk	Project receptors	Impact type	Planned Controls	Initial risk rating (RCP8.5 2050-2079)				
							Likelihood	Consequence	Risk rating		
		unacceptable safety risks.									
9	Increased wildfire risk	Potential danger to decommissioning activities over dry periods	Direct	Workforce	Safety and health	A DEMP will be developed which will be secured through a Requirement on the **Draft DCO (Application Document Ref. 3.1)**. This will outline relevant mitigation measures.	Rare	Minor	Low		Not Significant
10	Increase in storm intensity	Damage to materials and equipment resulting in delays to programme and associated costs and/or unacceptable safety risks.	Direct	Built assets, materials, staff facilities and access routes to sites	Asset damage	A DEMP will be developed which will be secured through a Requirement on the **Draft DCO (Application Document Ref. 3.1)**. This will outline relevant mitigation measures.	Unlikely	Minor	Low		Not Significant
11	Sea level rise	Reduced viability of and access to sites (such as heavy rain resulting in surface water flooding of local roads, sources of power supply or inundation of sites).	Direct	Built assets, materials, staff facilities and access routes to sites	Asset damage	The Drainage Strategy (Annex 3 **of ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)**) identifies drainage arrangements to attenuate the Proposed Development's surface water runoff and minimise flood risk to the site and surrounding areas. Flood resilience measures to infrastructure are set out in **ES Volume II Appendix 12A:** Flood Risk Assessment (**Application Document Ref. 6.3**) to allow for climate change.	Unlikely	Minor	Low		Not Significant

18A.7 Mitigation, Monitoring and Enhancement Measures

18A.7.1 Predicted climate change impacts in terms of increases to rainfall, river flows and sea levels are considered in the Flood Risk Assessment (**ES Volume II Appendix 12A (Application Document 6.3)**) over the lifetime of the Proposed Development.

18A.7.1 As there are no significant residual impacts, no additional mitigation, monitoring and enhancement measures have been identified.

18A.8 Limitations or Difficulties

18A.8.1 While modelled climate change projections represent anticipated average weather conditions, they do not capture the full range of possible future severe weather events (e.g. droughts, heatwaves and prolonged heavy rainfall).

18A.8.1 The CCRA assumes that the defined mitigation measures will be incorporated into the Proposed Development design. No additional mitigation has been identified as necessary for any stage of the Proposed Development.

18A.9 Summary of Likely Significant Residual Effects

18A.9.1 Table 18A.8 below presents the residual risk rating, which is based on the assumption that further adaptation measures are implemented, and if adaptation measures are not implemented then this residual risk rating would not apply and the original initial risk rating would remain. Should additional adaptation measures be implemented then there are no risks rated as 'significant'.

18A.9.1 For further details on the risk rating both initial and residual please refer to Section 18A.7, where details can be found on the embedded and recommended adaptation measures for each risk, alongside the given risk ratings.

Table 18A.8 Residual Risk Rating

Risk rating	High emissions scenario RCP 8.5 2020-2049 — 2050 - 2079
Low	31
Medium	3

Risk rating	High emissions scenario RCP 8.5 2020-2049 — 2050 - 2079
High	0
Extreme	0

18A.10 Conclusions

18A.10.1 Following the undertaking of the CCRA, a number of climate risks were identified for the construction, operational and decommissioning phases of the Proposed Development. A total of 34 climate risks were identified, with the overarching climate risks relating to flooding, changing temperatures and storm events. The initial risk rating took into account any existing embedded controls, as those climate risks which did not have embedded controls were generally rated higher than those which did.

18A.10.1 Table 18A.8 shows that following the implementation of the recommended adaptation measures there are no risks rated as high or extreme, and therefore none categorised as ‘significant’ under RCP 8.5 scenario. Should the proposed adaptation and monitoring measures, alongside the planned embedded controls for the Proposed Development, be implemented the risk posed by the identified climate risks reduced greatly. Based on this the residual risk assessment identified no ‘significant’ climate risks.

18A.11 References

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