Lighthouse Green Fuels Development Consent Order

Preliminary Environmental Information Report

Chapter 15: Climate Change Resilience

Planning Inspectorate Reference: EN0110025

2nd December 2025

Contents

Tables

1. Introduction

1.1 Background

1.1.1 This chapter presents the findings of the preliminary assessment of the likely significant effects arising from future climate change on the Proposed Development. This assessment considers operation and decommissioning only in line with the approach agreed in Scoping Opinion.

1.1.2 This chapter sets out the relevant legislation, policy, standards and guidance applied to the assessment process; consultation undertaken to inform the assessment; assessment methodology; the relevant baseline conditions upon which the assessment is based; embedded mitigation considered in place before the assessment is undertaken; the likely significant effects that may arise as a result of the Proposed Development considering embedded mitigation; further mitigation proposed to reduce or remove identified likely significant effects; the remaining residual effects following further mitigation; and monitoring proposed for remaining significant effects.

1.1.3 The operational life of the Proposed Development is estimated to be at least 30 years (i.e. more than its 25 year design life), followed by 1-2 years for decommissioning. However, for the purpose of this chapter an extreme worst case design life of 50 years is assumed.

1.1.4 The scope of this climate change resilience assessment (CCRA) is set out in Table 1-1.

Table 1-1 Climate change resilience assessment scope

Aspect	Phase	Scoped in/out	Summary comments (including justification and assumptions relied upon for scoping out aspects)
Climate change resilience assessment (CCRA)	Construction	Scoped out	Climate change is not expected to be so significant within the construction stage timescales as to require additional mitigation beyond current best practice.
	Operation	Scoped in	N/A
	Decommissioning	Scoped in	N/A

1.1.5 In-combination climate change impacts (ICCI) are considered within individual environment topic chapters where relevant.

2. Legislation and Planning Policy Context

2.1 Overview

2.1.1 Table 2-1 below outlines the policy, legislation, and guidance have been identified as relevant to the assessment of climate change resilience for the Proposed Development.

Table 2-1 Relevant legislation, policy and guidance

Policy / Legislation / Guidance	Description
Legislation	
The Climate Change Act 2008, as amended by the Climate Change Act (2050 Target Amendment) Order 2019 (Ref 1)	The UK legislative basis to address climate change. It sets the requirement for a national adaptation programme and associated publication of a national climate change risk assessment every five years. The *Climate Change Act* provides the policy framework to promote climate change adaptation action in the UK.
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref 2)	These regulations were introduced to transpose the amended EU Directive 2011/92/EU, as updated by Directive 2014/52/EU, into UK law. Their main aim is to ensure that environmental considerations are fully integrated into the planning process for nationally significant infrastructure projects.
Policy	
Overarching National Policy Statement for Energy (EN-1) 2024 (Ref 3)	Section 4.10 of the Policy Statement highlights that "the Secretary of State should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections and associated research and expert guidance (such as the EA's Climate Change Allowances for Flood Risk Assessments) available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure, including any decommissioning period."
National Policy Statement for Renewable Energy Infrastructure (EN-3) 2023 (Ref 4)	EN-3 requires that climate change resilience be addressed as part of the Environmental Statement (ES) accompanying any application. Applicants must assess the resilience of the project to climate change over its lifetime, considering risks such as: • Rising sea levels and storm surge • Increased flooding • Higher temperatures • Increased drought risk affecting water resources
UK marine policy statement (MPS) 2021 (Ref 5)	The UK MPS provides a strategic framework for marine planning across the UK. Its primary aim is to support the sustainable development of the UK marine area by balancing environmental protection with economic and social needs. It guides the preparation of Marine Plans

Policy / Legislation / Guidance	Description
	and informs decisions on marine activities such as energy production, shipping, and coastal development.
North East Inshore and North East Offshore Marine Plan 2021 (Ref 6)	This document sets out a strategic framework for managing the sustainable use, protection, and development of the marine environment in the North East Inshore and Offshore areas of England. It outlines environmental priorities and constraints that must be considered during project planning and assessment of coastal developments.
Climate Change Adaptation: Policy Information (Ref 7)	The policy paper states that: "Preparing for a changing climate, or climate adaptation, will help the UK to reduce negative consequences of climate change and take advantage of new opportunities" and provides an overview of how the UK is preparing for climate change. This includes commitments to understanding the risks through the UK Climate Change risk assessment, preparing for climate change through the National Adaptation Programme, adapting services and infrastructure under the Adaptation Reporting Power (ARP).
National Planning Policy Framework (NPPF) 2024 (Ref 8)	Presents the Government's planning policies for England and how these are to be applied. Guidance relating to ways to minimise vulnerability and improve resilience to climate change impacts is mainly set out in Section 14: Meeting the Challenge of Climate Change, Flooding and Coastal Change.
The Third National Adaptation Programme (NAP3) and the Fourth Strategy for Climate Adaptation Reporting (2023 – 2028) (Ref 9)	The National Adaptation Programme (NAP) sets the actions that government and others will take to adapt to the challenges of climate change in the UK. It sets out key actions for the next five years, including protecting and adapting local businesses, infrastructure and natural environment in the face of changing climate.
Stockton-on-Tees Borough Council Environmental Sustainability and Carbon Reduction Strategy 2022-2032 (Ref 10)	This Strategy 2022-2032 sets out the Local Authority's strategy for achieving net zero emissions by 2032 and adapting to climate change. The Strategy outlines 4 strategic aims, of which Aim 4 is *Adapt to the impacts of climate change.*
Stockton-on-Tees Borough Council Local Plan 2019 (Ref 11)	The Local Plan promotes development that is resilient to climate-related risks such as flooding and extreme weather events.
Redcar and Cleveland Local Plan 2018 (Ref 12)	The Local Plan includes policies and strategic objectives that directly address environmental sustainability and adaptation. It promotes the use of low-carbon technologies, encourages efficient use of natural resources, and highlights the need to adapt to increased flood risk.
Guidance	
National Planning Practice Guidance (NPPG): Climate	Explains the processes and tools that can be used through the planning system in England.

Policy / Legislation / Guidance	Description
Change 2019 (Ref 13)	The Guidance on Climate Change advises how to identify suitable mitigation and adaptation measures in the planning process.
Institute of Environmental Management and Assessment (IEMA) EIA Guide to: Climate Change Resilience and Adaptation 2020 (Ref 14)	Hereafter referred to as 'the IEMA Guidance'. This guide provides a framework for the effective consideration of climate change resilience and adaptation in the EIA process. This guide has been used within the assessment approach.
ISO 14091:2021 Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment (Ref 15)	This international standard provides guidelines on approaches to assess climate change-related risks. It highlights the role of risk assessments in improving climate change adaptation planning and informing climate change adaptation activities from their implementation through to monitoring.

3. Assessment Methodology and Significance Criteria

3.1 Study area

3.1.1 In the context of CCRA, the receptor being assessed is the Proposed Development itself. The scope for the CCRA relates to the impact of climate on the Proposed Development (rather than the impact of the Proposed Development on climate). As such, the physical boundary for this assessment is defined as the Proposed Development, as per Figure 1.1 and Figure 1.2 (PEIR Volume 2), and covers all new or updated assets and infrastructure within this area.

3.1.2 In the context of a CCRA, all elements of the Proposed Development are located in relatively close proximity to each other. Therefore, the same baseline conditions and future baseline (projections) apply for all Proposed Development elements.

3.1.3 The temporal boundary of this assessment includes the operational and decommissioning phases of the Proposed Development. The construction period is likely to be up to four years in duration, (likely commencing in 2028). Climate change is not expected to be so significant within the construction programme timescales as to require additional mitigation beyond current good practice.

3.1.4 For the purpose of the CCRA, it has been assumed that the Proposed Development will have an anticipated design life of 25 years and a minimum 30 year operational life followed by a 1-2 year decommissioning period.

3.2 Sensitive receptors

3.2.1 Elements of the Proposed Development, as per Figure 1.1 and Figure 1.2 (PEIR Volume 2), are identified as receptors for the CCRA. This includes proposed infrastructure, assets (equipment, materials) and human health receptors (including workers within the Proposed Development during operation and decommissioning).

3.2.2 For the purpose of this assessment, the individual receptors comprising the Proposed Development were grouped into the following categories:

- Built assets – these include the SAF Production Facility and its components, feedstock storage and pre-processing area, bulk liquid storage, flares, back-up generators, and biomass-fired Combined Heat and Power (CHP) plant, existing third-party rail facility;
- Infrastructure – these include pipelines and cable connections (both import and export), hard landscaping (including pavement, parking,

temporary and permanent laydown areas), conveying corridors, drainage and marine transport infrastructure;

- SAF production process - this is treated as a distinct receptor from the SAF Production Facility and its physical components, as disruption to production can arise from impacts other than those on physical equipment; and
- Human receptors – including operational, maintenance and decommissioning staff.

3.3 Data sources

3.3.1 The following desktop sources have been used to inform the existing and future baseline conditions of the study area:

- HadUK weather data: HadUK-Grid is a collection of gridded climate variables derived from the network of UK land surface observations (Ref 18);
- UKCP18 National Climate Change Projections: These projections set out a range of possible climate scenarios for the UK until 2100 based on latest scientific findings (Ref 19); and
- UKCP18 Sea level anomalies for marine projections around UK coastline (Ref 20), 2007-2100.

3.3.2 Climate projections consider uncertainty due to natural variability and an incomplete understanding of the climate system and its imperfect representation in models. The projections do this by giving the probabilities of a range of possible outcomes.

3.3.3 Met Office UK Climate Projections 2018 (UKCP18) are the most recent and comprehensive climate change projections for the UK. In addition to projections for future climate they also contain a comprehensive set of observed historical climate observations.

3.4 Assumptions and limitations

3.4.1 It is assumed that the data, information, and sources obtained from all organisations, institutions, bodies, or individuals are accurate at the time of its acquisition and/or consultation. It is assumed that where information has been obtained from respected open-source repositories, these sources were accurate at the time of writing and all citations, copyright, and distribution requirements are correct and clearly communicated.

3.4.2 The limitations and assumptions for using the proposed methodology are:

- As noted within the IEMA (2020) guidance (Ref 14), the assessment method is largely qualitative, particularly the process of scoring risks;
- There is limited methodological guidance on the assessment of individual risks and their impact;.

- There is inherent uncertainty in climate change projections. The quantitative data used in this study was obtained from UKCP18 (Ref 19), the latest set of probabilistic projections for the UK;
- There is often uncertainty in the relationship between changes in climate hazards and the respective response in terms of asset performance.

3.5 Significance criteria

3.5.1 The significance of the climate risks identified in the CCRA is determined as a combination of the likelihood of a hazard having an impact on the Proposed Development, and the consequence of the impact occurring.

3.5.2 Likelihood and consequence are assessed on a qualitative four-point scale based on professional judgement in line with the IEMA (2020) guidance (Ref 14). Likelihood scores and definitions used in this assessment are provided in Table 3-1.

Table 3-1 Qualitative scale of likelihood of hazard impact

Score	Likelihood definition
High	Occurs many times during the lifetime of the Proposed Development (e.g. seasonally or lasts many years/ indefinitely).
Medium	Occurs more than once during the lifetime of the Proposed Development OR lasts several months/one year.
Low	Occurs once during the lifetime of the Proposed Development OR lasts several weeks.
Negligible	Unlikely to occur during the design life OR only lasts for a few days.

3.5.3 Table 3-2 sets out the scores and definitions for assessing consequences of hazard impact.

Table 3-2 Qualitative scale of consequence of hazard impact

Score	Consequence definition
High	Very large safety risk; and/or safety risk; and/or Very large financial loss; and/or Major breach in compliance and prosecution.
Medium	Large safety risks; and/or Large financial loss; and/or Expected to cause non-compliance.
Low	Moderate safety risks; and/or Small financial loss; and/or

Score	Consequence definition
	Might cause non-compliance.
Negligible	Very small or no safety risks; and/or Small financial loss.

3.5.4 The final significance matrix is set out in Table 3-3. IEMA (2020) guidance (Ref 14) states that professional judgement should be used to determine whether an effect is significant. Where a risk is identified as major or major/moderate, this has been deemed to be significant.

Table 3-3 Significance scoring matrix

		Consequence			
		High	**Medium**	**Low**	**Negligible**
Likelihood	**High**	Major (S)	Major/Moderate (S)	Moderate/ Minor (NS)	Minor/ Negligible (NS)
	Medium	Major/ Moderate (S)	Moderate (S)	Minor (NS)	Negligible (NS)
	Low	Moderate (S)	Minor (NS)	Minor (NS)	Negligible (NS)
	Negligible	Minor/ Negligible (NS)	Negligible (NS)	Negligible (NS)	Negligible (NS)

S = Significant | NS = Not Significant

4. Baseline Conditions

4.1 Current and future baseline

4.1.1 Information regarding historical climate conditions for the Proposed Development was obtained from HadUK observation data. HadUK data includes various climate metrics which mirror projection data to provide context for the future baseline. Historical climate conditions are provided within the 'Baseline Observation (1980-2010)' column of Table 4-1.

4.1.2 The future climate is presented for the 2030s (2020-2049), the 2050s (2040-2069) and 2080s (2070-2099) to identify the anticipated climate conditions. These projections are provided against the baseline period of 1981-2010 (based on model data), and 1991-2020 (current climate) as an indication of change from the baseline period.

4.1.3 The probabilistic projections in the UKCP18 dataset provide local low, central and high changes, corresponding to various probability levels (e.g. 10%, 50% and 90%). There are several Representative Concentration Pathways (RCPs) available for UKCP18 with each pathway representing a different climate scenario resulting in a different range of global mean temperature increases over the 21st century.

4.1.4 UKCP18 Probabilistic Climate Projections data for Representative Concentration Pathway (RCP) 8.5 was used to describe the future baseline (Ref 19). The use of RCP 8.5 as a future baseline, which represents a high emissions and high impact future scenario, is in line with IEMA (2020) guidance recommendations to take a conservative approach establishing realistic changes to future climatic conditions.

4.1.5 Table 4-1 contains both the historical baseline information, and the future climate change projections for multiple climate metrics. The table combines metrics describing both average and extreme conditions.

Table 4-1 Baseline and projection data for climate metrics. All projections data was taken for RCP 8.5 for pre-defined 30-year periods

Metric	Unit	Baseline observation (1980-2010)	Future climate (RCP8.5)		
			2030s	2050s	2080s
Summer mean temperature	˚C	14.7	+1.0	+1.9	+3.9
Winter mean temperature	˚C	3.9	+0.9	+1.6	+3
Average summer precipitation	mm	166	-5.9%	-13.7%	-23.1%

Metric	Unit	Baseline observation (1980-2010)	Future climate (RCP8.5)		
			2030s	2050s	2080s
Average winter precipitation	mm	122	+6.9%	+11.6%	+20.9%
Average daily maximum temperature in summer	˚C	19.4	+1.0	+2.0	+4.0
Average daily minimum temperature in winter	˚C	0.8	+0.9	+1.6	+3.0
Average number of heatwaves per year (3 days above 25˚C)	occurrences/ year	0.7	1.5	2.5	4.5
Average number of dry spells per year (10 or more days with no precipitation)	occurrences/ year	2.73	2.8	3.03	3.2

4.1.6 The Proposed Development is located alongside the tidal River Tees, which flows into the nearby North Sea. Therefore, it is potentially exposed to future sea level rise. Sea level projections at the closest marine projections data point, adjacent east of the Proposed Development, range from 0.12m in the 2030s to 0.74m in the 2080s. Table 4-2 presents the projected sea level rise for the 2030s, 2050s and 2080s using UKCP18 marine projections data for RCP8.5 (Ref 20).

Table 4-2 Sea level rise projections in metres presented as 50th percentile (10th percentile to 90th percentile in brackets) for RCP8.5

Metric	2030s	2050s	2080s
Sea level anomaly (m) from 1981-2000 baseline	+0.16 (+0.12 to +0.21)	+0.29 (+0.22 to +0.38)	+0.55 (+0.40 to +0.74)

4.1.7 Overall, the results suggest that the following future weather hazards are likely to be applicable to the Proposed Development:

- **Warmer winters**: During both operation and decommissioning, as Table 4-1 shows, both the winter average and average daily minimum temperatures are increasing;
- **Wetter winters and drier summers:** The data suggests that mean summer precipitation is projected to decrease by up to 23% by the 2080s while mean winter precipitation is projected to increase by up to 21% by the 2080s. by the 2080s; and
- **Hotter summers and increases in extreme heat:** The average summer temperatures are projected to increase from 14.7˚C to 18.6˚C,

as is the number heatwaves per year – from 0.7 heatwaves per year in the baseline period to 4.5 heatwaves per year in the 2080s.

4.1.8 The latest Met Office information about future changes to other variables suggests the following trends:

- Storms – There are no compelling trends in changes to storminess, as determined by maximum gust speeds, from the UK wind network over the last four decades. However, from 2050 onwards, increases in the frequency of winter storms are expected over the UK with deeper and more intense storms (Ref 21);
- Wind – From 2050 onwards, there is an increase in near surface wind speeds over the UK the winter season. Surface wind speeds increase more over western parts of the UK and over the ocean in winter and decrease across the UK in summer (Ref 22); and
- Lightning – There is likely to be an increase in lightning frequency over the UK in summer and spring, with a decrease in autumn. In winter, future decreases in lightning are seen over the sea to the north and west of the UK, where high flash rates are currently seen (Ref 21).

5. Mitigation and Enhancement Measures

5.1 Embedded mitigation

Operation

5.1.2 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to CCRA are presented in Table 5-1.

Table 5-1 Embedded mitigation measures relevant to CCRA

Climate hazard	Embedded mitigation measure
All hazards	– The design will be in accordance with the UK Building Regulations and BS EN codes. Where no BS EN code exists, the Eurocodes and ISO standards will be adopted (temperature, wind/storms, snow load). Structures have been designed to accommodate an increase in extreme wind and storm events, including ensuring emergency access routes to critical parts of the infrastructure, even in the event of flooding. – The plant will be subject to a global conformity assessment by a third party to demonstrate the components meet the requirements of applicable design, manufacture and conformity Directives and Regulations. – An Emergency Response Plan, including emergency shutdown plans, will be produced as part of the Operational Environmental Management Plan (OEMP) produced by the operator following granting of the DCO. – The Proposed Development design has considered Reliability, Availability and Maintainability (RAM) studies to ensure critical equipment has a back-up system in the event of maintenance or equipment failure, including during extreme weather events. (RAM) studies to ensure critical equipment has a back-up system in the event of maintenance or equipment failure, including during extreme weather events. – A site-wide maintenance system will be in operation at the Proposed Development which will incorporate regulatory, and equipment manufactures inspection and maintenance requirements. The Proposed Development will be subject to a defined maintenance regime in accordance with equipment manufacturers requirements. This will contribute to resilience of physical assets to extreme weather events. – Maintain critical inventory and develop contingency logistics plans in case of supply chain disruption.
Heavy precipitation and flooding	– The finished floor level of the development and drainage design will be informed by the Flood Risk Assessment (FRA). The FRA will assess flood risk from all sources of flooding and identify appropriate mitigation measures. Consultation with the Environment Agency will be

Climate hazard	Embedded mitigation measure
	ongoing during the assessment. This includes seeking agreement of the appropriate climate change allowances most applicable to the Proposed Development. – Drainage across the Proposed Development will be designed to minimise water held within the Proposed Development preventing surface water flooding. It is assumed that sensitive electrical equipment will be housed in areas appropriately shielded from precipitation and flooding i.e. elevate critical infrastructure above flood level. – An appropriate surface water drainage system, taking into account future climate projections, will be implemented that will incorporate appropriate pollution control and maintenance measures to mitigate the risk of pollution during operation. – Hydraulic modelling may be undertaken as part of the FRA if required by the EA to inform the design of appropriate mitigation and ensure no unacceptable flood risk to the Proposed Development. – Nature based solutions and Sustainable Drainage Systems will be incorporated within the design where practicable. – The storage buildings will be covered for inclement weather protection, or alternatively, constructed within a dedicated building. Alternatively, storage will be provided by enclosed silos. – Exposed machinery will be Ingress Protection Rated (IP-rated) and installed on plinths or raised foundations. – Conveying equipment will be elevated and enclosed, reducing impacts of potential flooding.
Storms and high winds	– The Proposed Development will have its own CHP plant installed to provide power to reduce national/district grid reliance. – The flare design will mitigate against potential for blowout due to wind or rain and will include facilities for automatic re-ignition. – Lightning protection systems and surge protection for electrical systems will be installed to mitigate the risk of lightning strikes damaging the Proposed Development. – Emergency systems, including flare, will be designed for total electrical power failure scenario.
Extreme heat	– Design upper temperature thresholds will account for projected ambient temperature increases, recognising that the structures will also be designed to withstand the greater heat of the SAF production operation and electricity and steam production. – Major electrical substations or cabins will be ventilated to manage overheating. – The conveying equipment will include belt tensioners to accommodate thermal variation and support steelwork will have sliding connections or air brakes to allow for thermal expansion. Pneumatic system accommodates expansion bellows or stress loops to allow for thermal stress.
Sea level rise	– The design will account for projected sea level rise, including where necessary material selection and corrosion control and allowance (for example, the use of marine-grade materials and installation of saltwater barriers).

Decommissioning

5.1.3 An outline Decommissioning Environmental Management Plan (oDEMP) will be developed to cover the decommissioning phase and submitted with the DCO application. The oDEMP will consider measures to reduce the risk of weather and climate change impacts during the decommissioning phase. Measures will be developed for inclusion in the oDEMP at the ES stage to support in the preparation and response to weather and climate change impacts during the construction phase. An Emergency Response Plan would be produced as part of the oDEMP.

5.1.4 It is also assumed that best practice in health and safety and decommissioning techniques will have evolved with regards to climate risks as these risks have emerged and become more generally recognised.

6. Preliminary assessment of likely Impacts and effects of the Proposed Development

6.1 Overview

6.1.1 This section presents the results of the assessment of likely significant effects with the embedded and good practice mitigation measures, described in the previous section, in place. The full assessment can be found in Appendix 15A: Climate Change Resilience Assessment.

6.2 Operational impacts

6.2.1 The operational lifespan of the project Proposed Development is estimated to be a minimum of 30 years, with a 1-2 year decommissioning period after this. This Climate Change Resilience report therefore assesses a worst-case operational lifespan for the proposed development of a minimum of 30 years. The SAF Production Facility is potentially vulnerable to changes in climate variables during the operation phase.

6.2.2 During the operational phase, there is the potential for adverse weather conditions to impact the Proposed Development, if it is not properly designed. Extreme heat is projected to become more frequent. This has the potential to exacerbate deterioration of material structures and fabric, including potential melting and deformation of materials, increasing the occurrence of faults in equipment and machinery and increasing the demand for cooling to prevent overheating of equipment. However, mitigation actions reduce this risk as even though temperatures increase in the future the risk is not significant. Furthermore, the applicant has developed and operated industrial plant in the Middle East for many years and the plant itself will be designed to withstand the greater heat of the SAF production operation and electricity and steam production. There is a risk of heat-related illness to staff and workers within the Proposed Development.

6.2.3 Risks from heavy precipitation and flooding are also projected to increase, including risk of more frequent power outages and operational disruption during extreme precipitation events, physical damage to assets as a result of flooding, and safety risks to operational staff.

6.2.4 Storms and winds are projected to increase in frequency and intensity, potentially leading to more frequent power outages and operational disruption, increased risk of physical damage to the Proposed Development and safety risks for operational staff.

6.2.5 It is assumed that embedded mitigation measures outlined in Section 5: Mitigation and Enhancement Measures will provide sufficient levels of resilience to the projected changes in climate for all receptors considered in this assessment. All climate hazards identified in this chapter will be considered within the design of the Proposed Development and reflected in relevant management plans. The risk to staff from extreme weather will be mitigated through the implementation of appropriate safety measures and by following government guidelines.

6.3 Decommissioning impacts

6.3.1 Decommissioning of the Proposed Development is expected to last in the range of 1-2 years and occur a minimum of 30 years from the first year of operation. Therefore, decommissioning is likely to occur after 2061.

6.3.2 During the decommissioning stage of the Proposed Development, there is a potential for extreme weather conditions to pose risks to decommissioning plant and equipment and workers. Workers may be at risk of heat-related illness during periods of extreme heat. Storms, high winds and heavy precipitation may physically damage plant, vehicles and equipment, and pose health and safety risks to workers.

6.3.3 Risks to human health will be mitigated through adherence to relevant health and safety measures, provision of PPE where necessary and by rescheduling visits to the Proposed Development and maintenance activities during extreme weather conditions. Appropriate cooling and shading will be installed at workstations to protect workers from heat stress.

6.3.4 As the decommissioning phase is likely to be in the latter half of this century (post 2060), it is also anticipated that some climate hazards will have either intensified, or become more frequent, or both, as outlined in Section 4: Baseline Conditions. However, it is also assumed that best practice in health and safety and decommissioning techniques will have evolved with regards to climate risks as these risks have emerged and become more generally recognised.

6.4 Additional mitigation

6.4.1 Additional mitigations are actions that require additional site and project specific activity in order to achieve a reduction in effect, and/or anticipated outcome.

6.4.2 It is assumed that the embedded mitigation measures will provide sufficient levels of mitigation against projected climate changes and that no additional mitigation is proposed.

6.5 Monitoring measures

6.5.1 To monitor the effects of climate change on the Proposed Development the following measures shall be applied:

- Monitoring of weather forecasts for extreme conditions and activation of response plans as needed to reduce risks to the Proposed Development from heatwaves, heavy rainfall, and strong winds during both operation and decommissioning phases;
- Regular monitoring of weather-related impacts throughout the operational phase of the Proposed Development, acknowledging the uncertainties in climate projections. This monitoring will help evaluate the effectiveness of mitigation measures and should be updated when new climate data becomes available;
- A record of extreme weather incidents impacting the Proposed Development (e.g., road surface damage, flooding, snow, ice) will be developed and monitored to help identify thresholds that trigger maintenance. Post-event inspections should follow intense rainfall or other extreme conditions to assess damage and apply necessary mitigation;
- Conduct regular inspections of drainage systems, materials, and structures to identify signs of deterioration. Additional checks should be carried out after extreme weather events (e.g., flooding, heatwaves, droughts, storms), with repairs or replacements scheduled as needed; and
- Reassess the frequency of periodic replacement activities and bring them forward, if necessary, for example following an extreme weather event.

7. Residual Effects and Conclusions

7.1.1 Based on the assumption that all mitigations presented in Section 5 and Section 6.4 are fully, and successfully, implemented into the design and operation of the Proposed Development, the CCRA concludes that there are no residual significant effects.

7.1.2 The following risks are noted as being mitigated by the embedded mitigations, reducing their significance conclusion.

- Increased operational disruption and potential power loss due to both *storms and high winds* and *heavy precipitation and flooding*: Implementation of backup generators at the facility are expected to mitigate this risk. This reduces the significance conclusion (pre-mitigation) of Moderate (S) to Minor (NS) (post mitigation); and
- Increased operational disruption resulting from supply chain disruption due to extreme weather: Maintain critical inventory and develop contingency logistics plans. This reduces the significance conclusion (pre-mitigation) of Moderate (S) to Minor (NS) (post mitigation).

8. Summary of Significant Effects

8.1.1 Table 8-1 presents a summary of the CCRA, detailing mitigations and residual effects.

8.1.2 The CCRA concludes that there are no likely significant effects, assuming mitigation is successfully implemented into the design and operation of the Proposed Development.

Table 8-1 CCRA summary

Potential Impact	Receptor	Description of Impact	Significance of Effect	Relevant additional mitigations	Residual Effects
Extreme heat	All receptors	Risk of equipment overheating and/or reduced equipment efficiency. Hastened degradation of materials and machinery due to extreme temperature events. Greater cooling demand.	Not significant	Standard plant design and specification	No significant residual effects identified
Storms and high winds	All receptors	Risk of physical damage to assets and safety risks to human receptors.	Not significant	None required	No significant residual effects identified
		Increased operational disruption and potential power loss. Supply chain disruption.	Moderate (S)	The Proposed Development includes power generation & emergency back up systems Maintain critical inventory and develop contingency logistics plans. Emergency systems, including flare, will be designed for total electrical power failure scenario.	Minor adverse (NS)

Potential Impact	Receptor	Description of Impact	Significance of Effect	Relevant additional mitigations	Residual Effects
Heavy precipitation and flooding	All receptors	Risks of physical damage due to flooding, particularly to electrical equipment. Safety risks to human receptors. Mobilisation of pollutants during extreme precipitation events. Potential power outages and operational disruption.	Moderate (S)	Appropriate site levels and drainage systems. Power generation will be installed within the Proposed Development.	Minor adverse (NS)
Drought	All receptors	Potential damages and safety risks caused by land subsidence due to drought. Low availability of process water and cooling water during drought potentially leading to temporary plant shutdown.	Not significant	None required	No significant residual effects identified
Sea level rise	All receptors	Risks of physical damage due to flooding, including deterioration of material structure and fabric. Power outages and disruption to business continuity. Safety risk to operational staff.	Not significant	Finished floor level to avoid flooding to be set at an elevation agreed with the Environment Agency. None required	No significant residual effects identified

References

Ref 1 UK Government, “Climate Change Act 2008,” [Online]. Available: https://www.legislation.gov.uk/ukpga/2008/27/contents. [Accessed July 2025]

Ref 2 UK Government, “The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017,” 2017. [Online]. Available: https://www.legislation.gov.uk/uksi/2017/572/contents. [Accessed October 2025]

Ref 3 UK Government, “Overarching National Policy Statement for Energy (EN-1),” 2024 [Online]. Available: https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1. [Accessed July 2025].

Ref 4 Department for Energy Security and Net Zero, “National Policy Statement for Renewable Energy Infrastructure (EN-3)” 2023. [Online]. Available at: https://assets.publishing.service.gov.uk/media/64252f5f2fa848000cec0f52/NPS_EN-3.pdf [Accessed October 2025]

Ref 5 HM Government, “UK Marine Policy Statement”, 2011. [Online]. Available: https://assets.publishing.service.gov.uk/media/5a795700ed915d042206795b/pb3654-marine-policy-statement-110316.pdf [Accessed October 2025]

Ref 6 HM Government, “North East Inshore and North East Offshore Marine Plan”, 2021. [Online]. Available: https://assets.publishing.service.gov.uk/media/60f6f3df8fa8f50c7450ebf1/FINAL_North_East_Marine_Plan__1_.pdf [Accessed October 2025]

Ref 7 DEFRA, “Climate Change Adaptation: Policy Information,” 2022. [Online]. Available: https://www.gov.uk/government/publications/climate-change-adaptation-policy-information/climate-change-adaptation-policy-information.

Ref 8 UK Government, “National Planning Policy Framework,” 2024. [Online]. Available: https://www.gov.uk/government/publications/national-planning-policy-framework--2. [Accessed July 2025].

Ref 9 UK Government, “Third National Adaptation Programme (NAP3),” 2023. [Online]. Available: https://www.gov.uk/government/publications/third-national-adaptation-programme-nap3. [Accessed July 2025].

Ref 10 Stockton-on-Tees Borough Council, “ Environmental Sustainability and Carbon Reduction Strategy 2022-2032,” [Online]. Available: https://www.stockton.gov.uk/media/3265/Environmental-Sustainability-and-Carbon-Reduction-Strategy-2022-%202032/pdf/Environmental_Sustainability_Carbon_Reduction_Strategy_2022-2032_Accessible.pdf. [Accessed July 2025].

Ref 11 Stockton-on-Tees Borough Council, “Local Plan Adopted 30 January 2019”, 2019. [Online]. Available: https://www.stockton.gov.uk/media/2518/Local-Plan-2019/pdf/Local_Plan_2019.pdf?m=1645450086087. [Accessed October 2025]

Ref 12 Redcar and Cleveland Borough Council, “Redcar & Cleveland Local Plan Adopted May 2018”, 2018. [Online]. Available: https://www.redcar-cleveland.gov.uk/sites/default/files/2022-

04/Local%20Plan%20Adopted%20May%202018.pdf. [Accessed October 2025]

Ref 13 C. a. L. G. Ministry of Housing, “National Planning Practice Guidance: Climate Change,” 2019. [Online]. Available: https://www.gov.uk/guidance/climate-change.

Ref 14 Institute of Environmental Management and Assessment, “Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation,” 2020. [Online]. Available: https://www.iema.net/media/mabhqino/iema-eia-climate-change-resilience-june-2020.pdf. [Accessed July 2025].

Ref 15 “ISO 14091:2021. Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment,” 2021. [Online]. Available: https://www.iso.org/standard/68508.html. [Accessed 22 08 2025].

Ref 16 Stockton-on-Tees Borough Council, “Local Plan (Adopted 30 January 2019),” 2019. [Online]. Available: https://www.stockton.gov.uk/media/2518/Local-Plan-2019/pdf/Local_Plan_2019.pdf?m=637810468860870000. [Accessed July 2025].

Ref 17 Redcar and Cleveland Borough Council, “Local Plan (Adopted May 2018),” [Online]. Available: https://www.redcar-cleveland.gov.uk/planning/local-plan/redcar-and-cleveland-local-plan. [Accessed July 2025].

Ref 18 Met Office Hadley Centre, “adUK-Grid gridded and regional average climate observations for the UK,” 2018. [Online]. Available: https://catalogue.ceda.ac.uk/uuid/4dc8450d889a491ebb20e724debe2dfb/. [Accessed July 2025].

Ref 19 Met Office Hadley Centre, “UKCP18 Probabilistic Climate Projections,” 2018. [Online]. Available: https://catalogue.ceda.ac.uk/uuid/9842e395f2d04f48a177c3550756bf98/. [Accessed July 2025].

Ref 20 Met Office, “Sea level anomalies for marine projections around UK coastline, 2007-2100,” [Online]. Available: https://ukclimateprojections-ui.metoffice.gov.uk/products/form/MS4_Anomalies_Subset_01. [Accessed August 2025].

Ref 21 Met Office, “UK Climate Projections: Headline Findings,” 2022. [Online]. Available: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v4_aug22.pdf. [Accessed July 2025].

Ref 22 Met Office, “UK Climate Projections 2018 Wind Fact Sheet,” 2021. [Online]. Available: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-wind_march21.pdf. [Accessed July 2025].

Lighthouse
GREEN FUELS

www.lighthousegreenfuels.co.uk