CAS-03463-R2W9C2 - Kronospan Low Carbon CHP Facility

Environmental Statement

Vol2: Chapter 9.0 – Climate Change

Prepared for

December 2025
DNS5-2-009

Document Control

Revision	Date	Prepared By	Reviewed / Approved By
DNS5-2-009	December 2025	JS	RF/JS/BC
DNS5-2-009 Rev 1			
DNS5-2-009 Rev 2			

Well House Barns, Chester Road, Bretton, Chester, CH4 0DH
1st Floor, Barfield House, Alderley Road, Wilmslow, SK9 1PL
Maling Exchange, Studio 307, Hoults Yard, Walker Road, Newcastle Upon Tyne, NE6 2HL

T: 0344 8700 007
enquiries@axis.co.uk
www.axis.co.uk

CONTENTS

TABLES

APPENDICES

9.0 CLIMATE CHANGE

9.1 Introduction

Introduction

9.1.1 This chapter of the Environmental Statement (ES), along with the accompanying appendices, present the findings of an assessment of the resilience of the Proposed Development to the effects of climate change (within the Climate Change Resilience Assessment), and the likely significant effects of the Proposed Development on climate change, specifically the impact of greenhouse gas (GHG) emissions (within the GHG Emissions Assessment).

9.1.2 Naturally occurring GHG emissions such as carbon dioxide (CO_2) act as a blanket around the earth (a process called the 'GHG effect'). Increases in GHG emissions are resulting in an enhancement of the GHG effect, resulting in an increase in global temperatures (global warming). These changes in global temperatures are driving changes in short-term weather events as well as extremes in longer-term climate variability (referred to as climate change).

9.1.3 A description of the Proposed Development is provided in **ES Chapter 4.0 (Description of the Proposed Development).**

Competence

9.1.4 This chapter has been prepared by Juliet Snow. Juliet is an Environmental Consultant and Practitioner of the Institute of Environmental Management and Assessment (Institute of Sustainability and Environmental Professionals (ISEP) (PISEP)) with three years' experience in planning and the environment in a variety of sectors including energy, transport and waste.

9.1.5 The chapter has been reviewed by Rosalind Flavell. Rosalind is a Lead Environmental Consultant and is a Chartered Environmentalist (CEnv) and Chartered Scientist (CSci) with over 15 years' experience. Rosalind has extensive knowledge of planning and environmental issues and has undertaken and managed Environmental Impact Assessment (EIA) projects on matters relating to climate change for a range of renewable technologies including waste and energy.

9.2 Planning Policy, Legislation and Guidance

National Planning Policy

9.2.1 Planning Policy Wales (PPW), edition 12 was published in February 2024. This sets out the land use planning policies of the Welsh Government and is supported by a series of Technical Advice Notes (TANS), Welsh Government Circulars and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW, the TANS, Minerals TANS (MTANS) and policy clarification letters comprise national planning policy. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales.

9.2.2 PPW states that:

"The planning system should not be used to secure objectives which are more appropriately achieved under other legislation. The aim should be to maintain the principle of non-duplication, wherever possible, even where powers and duties resulting from other legislation may also be the concern of local authorities. This does not mean failing to address issues which the planning system should be properly concerned with. In practice issues will often overlap and in such circumstances the planning system will have a preventative and early role to play and is capable of both avoiding the creation of problems and securing multiple benefits through positive and proactive planning approaches. Where appropriate it will be advantageous to address issues in parallel. The grant of planning permission does not remove the need to obtain any consent that may be necessary, nor does it imply that such consents will be forthcoming, and similarly, the granting of other consents should not be used to justify the granting of planning permission"

9.2.3 With reference to Climate Change, PPW states:

9.2.4 *"In 2019 the Welsh Government declared a climate emergency in order to coordinate action nationally and locally to help combat the threats of climate change. The planning system plays a key role in tackling the climate emergency through the decarbonisation of the energy system and the sustainable management of natural resources. The transition to a low carbon economy not only brings opportunities for*

clean growth and quality jobs but also has wider benefits of enhanced places to live and work, with clean air and water and improved health outcomes.

9.2.5 *The Environment (Wales) Act 2016 sets a legal target of reducing greenhouse gas emissions in Wales by at least 80% in 2050. The Act also requires a series of interim targets (for 2020, 2030 and 2040) and carbon budgets. The budgets set a limit on the total amount of greenhouse gas emissions in Wales over a 5-year period to serve as stepping stones and ensure progress is made towards the decadal targets.*

9.2.6 *In May 2019 the Climate Change Committee published its recommendation for the UK to set a net zero target for 2050. It recommended Wales set a 95% target as our fair contribution to the UK effort. The Welsh Government accepted this recommendation but is seeking to go beyond 95% to reach net zero. In October 2021 the Welsh Government published its Net Zero Wales Carbon Budget 2 Plan. This Plan focuses on our second carbon budget (2021 –2025) and looks beyond this time period to start building the foundations for Carbon Budget 3 and our 2030 target, as well as net zero by 2050.*

9.2.7 *Climate change is a global challenge, with impacts felt at the local level presenting a significant risk to people, property, infrastructure and natural resources. We need to plan for these impacts, reducing the vulnerability of our natural resources and build an environment which can adapt to climate change. The planning system plays a significant role in managing this risk. Development allowed today will be around for decades to come. The most important decision the planning system makes is to ensure the right developments are built in the right places."*

9.2.8 There is no TAN relating to climate change. However, climate change has been addressed in several of the TANs.

9.2.9 The GHG emissions associated with the proposed Low Carbon CHP Facility, which would contribute or ameliorate climate change, have been calculated in **Appendix 9C**. Additionally, the resilience of the proposed Low Carbon CHP Facility to the effects of climate change has been assessed in **Appendix 9B**.

Local Planning Policy

9.2.10 The adopted local development plan for Wrexham County Borough Council (WCBC) comprises the Wrexham Unitary Development Plan 1996-2011 (the UDP) which was

adopted in February 2005. However, the local development plan has been through significant upheaval in recent years. WCBC adopted the Local Development Plan 2013-2028 (the LDP) on 20 December 2023, however, the decision to adopt the LDP has subsequently been quashed by a High Court Order issued on 12 June 2025. The LDP has therefore been returned to unadopted status and the UDP has been returned to being the adopted development plan. Further information regarding the status of the UDP and LDP is provided in the Planning Statement (**DNS4-001**).

9.2.11 There is no mention of climate change within the UDP.

9.2.12 The relevant policies from the LDP are set out below:

Policy SP14: Natural Environment

9.2.13 *"Development will only be permitted where it seeks to protect, conserve and enhance the natural environment including: …*

9.2.14 *Natural landscape features and Green Infrastructure such as trees, hedges and woodland which contribute to the quality and diversity of the natural environment and play an important role in mitigating the impact of climate change"*

Policy SP18: Climate Change

9.2.15 *"To mitigate against the effects of climate change and adapt to its impacts, development proposals will need to demonstrate that they have taken into account the following:*

i. Reducing carbon emissions;

ii. Protecting and increasing carbon sinks;

iii. Adapting to the implications of climate change at both a strategic and detailed design level;

iv. Promoting energy efficiency and increasing the supply of renewable energy; and

v. Maintaining ecological resilience;

vi. Avoiding areas susceptible to flood risk in the first instance in accordance with the sequential approach set out in national guidance. Highly vulnerable development, as

defined in TAN15: Development and Flood Risk, should not be located within zone C2;

vii. Preventing development that increases flood risk; and

viii. Assesses the potential effects of climate change when preparing a Flood Consequence Assessment for the site."

Policy RE1: Development and Renewable Energy/Low Carbon Technology

9.2.16 *"The Council require developers of the Key Strategic Sites and major sites (100 dwellings or more or development exceeding 1000m2) to incorporate schemes which generate energy from renewable and low carbon technologies unless it is demonstrated that it would not be financially or technically viable to do so. This includes opportunities to minimise carbon emissions associated with the heating, cooling and power systems for new development.*

9.2.17 *An independent energy assessment investigating the financial viability and technical feasibility of incorporating such schemes will be required to support applications."*

Legislation and Guidance

9.2.18 The United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992 with the aim of preventing dangerous human interference with the climate system. Following the adoption of the UNFCCC, several agreements have followed including the Kyoto Protocol and more recently the Paris Agreement.

9.2.19 The Kyoto Protocol was adopted on 11 December 1997 and, owing to a complex ratification process, entered into force on 16 February 2005. The Kyoto Protocol is an international agreement that commits industrialised countries and economies in transition to reduce GHG emissions in accordance with agreed individual targets. The targets were based on the scientific consensus that global warming is occurring; that human-made CO_2 emissions are driving it and that industrialised countries and economies in transition are largely responsible for the current high levels of GHG emissions in the atmosphere.

9.2.20 Although the Kyoto Protocol technically remains in force, the Paris Agreement has, in effect, superseded the Kyoto Protocol. This was adopted on 04 November 2016. This is an international agreement created as a result of the UNFCCC Conference

of the Parties (COP) 21 in 2015. The goal of the Paris Agreement is to limit global average temperature rise to well below 2 °C, preferably 1.5 °C, compared to pre-industrial levels. The agreement was a landmark in the climate change process. The Paris Agreement recognised that climate change is a shared problem and called on all countries to set emissions targets. Today, 194 parties have committed to the Paris Agreement and are required to produce Nationally Determined Contributions that set out their targets to meet the Paris Agreement targets through national legislation.

9.2.21 The UK's legislation on climate change was established within the Climate Change Act (2008). This set out the UK Government's initial commitment to reduce GHG emissions in the UK by at least 80% of 1990 levels by 2050. The GHG emissions target was subsequently amended (Climate Change Act 2008 (2050 Target Amendment) Order 2019) to net-zero greenhouse gases by 2050. As part of the Climate Change Act (2008), the UK Government was required to set legally binding 'carbon budgets' to act as stepping stones towards 2050. To date, six carbon budgets have been legislated, with the fourth, fifth and sixth carbon budgets in line with the time frame Development. The seventh carbon budget has been recommended by the Climate Change Committee (CCC) but has not been legislated yet. These budgets are for the whole for the UK and include Wales.

9.2.22 However, as certain areas of environmental policy, including climate change, are devolved matters under the UK's constitutional framework, the Welsh Government and Parliament have the legal authority to create and implement their own legislation in these areas, separate from UK-wide laws. The Welsh Government's net zero target for 2050 was approved in March 2021 and align with the UK Government targets.

9.2.23 The Welsh Government's interim reduction targets for 2030 and 2040 are summarised below:

- 2030 Target – 63% reduction; and
- 2040 Target – 80% reduction.

9.2.24 The Welsh Government has also established a series of five-year carbon budgets, summarised below:

- Carbon Budget 1 (2016-2020) – 23% reduction;

- Carbon Budget 2 (2021-2025) – 37% reduction;
- Carbon Budget 3 (2026-2030) – 58% reduction; and
- Carbon Budget 4 (2031-2035) – 73% reduction (recommended by CCC like the Seventh Carbon Budget in the UK).

9.2.25 Alongside the reduction targets, the Welsh Climate Change Adaptation National Adaptation Programme (NAP), previously called: 'Prosperity for All: A Climate Conscious Wales', is a plan to prepare Wales for the impacts of climate change. The program includes actions such as building flood defences, protecting water supplies, promoting sustainable farming, and increasing woodland cover.

9.2.26 On 20 June 2024, the Supreme Court handed down a majority judgement on R (on the application of Finch on behalf of the Weald Action Group) v Surrey County Council and others[1] – hereafter referred to as the 'Finch' judgement. The implications of the Finch judgement have been subject to considerable public analysis by expert legal commentators. This analysis has distilled three questions to determine whether EIA is required to assess indirect upstream and/or downstream effects. If all of the questions give rise to a positive response, then the EIA for the project must assess the upstream and/or downstream effects. If the answer to any of the questions is negative, then no such assessment is required. The three questions are:

- Would the development give rise to inevitable indirect upstream or downstream effects i.e. would there be inevitable causation?
- Is it possible to undertake evidence based meaningful assessment of the effects?
- Will an assessment reasonably conclude likely significant effect(s)?

9.2.27 This chapter of the ES has considered the direct and indirect GHG emissions associated with the Proposed Development including upstream and downstream sources of GHGs where it is possible to reasonably estimate the quantities. For example, the upstream GHG emissions associated with transportation and production of Flue Gas Treatment (FGT) reagents has been included, as has the

[1] *R (on the application of Finch on behalf of Weald Action Group) (Appellant) v Surrey County Council and others (Respondents)* [2024] UKSC 20

upstream GHG emissions associated with the transportation and treatment of FGT residues.

Additional Guidance

9.2.28 The following additional guidance documents have been used in undertaking this assessment:

- The GHG Assessment has been completed in accordance with the Institute of Sustainability and Environmental Professionals (ISEP) (formally the 'Institute of Environmental Management and Assessment' (IEMA)) Environmental Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance ('ISEP GHG Emissions Guidance'); and
- The Climate Change Resilience Assessment has been completed in accordance with the ISEP Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation ('ISEP Climate Change Resilience Guidance').

9.3 Consultation

EIA Scoping Direction

9.3.1 In accordance with Regulation 14 of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (The EIA Regulations), a formal request for a Scoping Direction was submitted to Planning and Environment Decisions Wales (PEDW) on 30 May 2024 and was accompanied by a Scoping Report (**Appendix 1C**) which set out the proposed EIA scope of the Proposed Development.

9.3.2 A formal Scoping Direction (**Appendix 1D**) was issued by PEDW on 31 July 2024 which confirmed that the Proposed Development would fall under Schedule 1, Part 10 of the EIA Regulations (and would therefore require EIA) and provided PEDW's opinion regarding the proposed EIA scope of the Proposed Development.

9.3.3 A response to the Scoping Direction setting out how each matter is addressed in the ES and details of where areas of disagreement are clarified and/or resolved is provided at **Appendix 1G**.

9.3.4 A summary of the Scoping Direction responses (and the Applicant's response) relevant to climate change is provided at **Table 9.1** below.

Table 9.1 – Summary of (Climate Change) Scoping Direction Responses

Consultee	Summary of Consultee Response	How Response has been Addressed in the ES
PEDW	PEDW supports the proposed methodology of the GHG Emissions Assessment that includes direct and indirect impacts. The assessment should capture the net change from the baseline situation, considering the number of vehicular trips in the existing situation and to the potential future situation where on-site waste will be converted to energy, taking into account some waste material will be imported. The assessment should also include any net difference in carbon from the current way in which energy and heat are generated to power existing operations, versus if the development is granted planning permission.	The GHG Emissions Assessment includes the net change from the baseline situation, including the change in vehicular trips and the change in which energy and heat are generated to power existing operations. The GHG Emissions Assessment can be found in **Appendix 9C**. The results of the GHG Emissions Assessment have been summarised in **Section 9.5**.
PEDW	PEDW supports the intention to provide a Climate Change Resilience Assessment to inform this chapter of the ES.	The Climate Change Resilience Assessment can be found in **Appendix 9B**. The results of the Climate Change Resilience Assessment can be found in **Section 9.4**.
PEDW	PEDW scope human health into the ES, but not as a standalone chapter. The climate change chapter must include an assessment of impact for human health	On-site workers have been included as a receptor in the Climate Change Resilience Assessment. The Climate Change Resilience Assessment can be found in **Appendix 9B**. The results of the Climate Change Resilience Assessment can be found in **Section 0**.

EIA Scoping Direction Addendum

9.3.5 Following receipt of the Scoping Direction (**Appendix 1D**), formal pre-application advice from PEDW (received 19 June 2024), further informal discussions with PEDW and informal pre-application discussions with WCBC, the Applicant issued (on 15 October 2024) a document to PEDW entitled 'EIA Scoping Direction Clarification and Update to the Proposed Development Design' (**Appendix 1E**). This document provided details of the proposed changes to the Proposed Development which arose since the initial pre-application advice was sought, as well as setting out broad areas of agreement and disagreement/clarification with the EIA Scoping Direction referred to above. A summary of the main Proposed Development design changes made at this point is provided below:

- The status of the existing K7 Biomass Plant would change from 'remaining in operation' to 'remain in situ but be used as a back-up biomass plant only' – as a result, the existing K7 Biomass Plant feedstock would be re-directed for use in the proposed Low Carbon CHP Facility.
- A detailed review of CHP Facility feedstock generated on-site was undertaken to understand the maximum wood residue feedstock that would be generated from existing and planned manufacturing operations.
- The proposed use of Refuse Derived Fuel (RDF) was removed.

9.3.6 The proposed change to the Proposed Development design also confirmed that the proposed electrical generating capacity of the proposed Low Carbon CHP Facility would increase from 30 megawatts (MW) to 40MW.

9.3.7 An EIA Scoping Direction Addendum (see **Appendix 1F**) was issued by PEDW on 14 January 2025 and provides PEDW's updated opinion regarding the proposed EIA scope of the Proposed Development.

9.3.8 A response to the Scoping Direction Addendum setting out how each matter is addressed in the ES and details of resolution of areas of disagreement is provided at **Appendix 1G**. The Scoping Direction Addendum provided no additional comments in relation to climate change.

Other Engagement with Stakeholders

9.3.9 No further engagement with stakeholders with regards climate change has been carried out.

Statutory Pre-Application Consultation

9.3.10 Sections 7, 8, 9, and 11 of the Developments of National Significance (Procedure) (Wales) Order 2016 (as amended) (the DNSPWO) and Section 61Z of the Town and Country Planning Act 1990 require the Applicant to undertake statutory consultation prior to submitting a DNS application. The statutory pre-application consultation period was between (insert date) and (insert date). THIS PARAGRAPH IS A PLACEHOLDER AND WILL BE FINALISED UPON COMPLETION OF PRE-APPLICATION CONSULTATION – THE PAC REPORT IS NOT YET AVAILABLE.

9.3.11 A series of responses from consultees received in month 2025 identified issues relating to climate change matters, as set out in **Table 9.2** below. Full consultee responses (and how each has been addressed) is provided in the Pre-Application Consultation (PAC) Report (**DNS4-009**). THIS PARAGRAPH IS A PLACEHOLDER AND WILL BE FINALISED UPON COMPLETION OF PRE-APPLICATION CONSULTATION – THE PAC REPORT IS NOT YET AVAILABLE.

Table 9.2 – Summary of (Climate Change) Pre-Application Consultation Responses

Consultee	Summary of Consultee Response	How Response has been Addressed in the ES

9.4 Climate Change Resilience

Assessment Methodology

Overview

9.4.1 This section provides details of the proposed EIA methodology to be adopted relevant to this topic. Where deviation is proposed from the generic significance matrix shown in **ES Chapter 2.0 (EIA Methodology)**, this is clearly described within the following sub-sections for each of the potential effects identified.

9.4.2 The Climate Change Resilience Assessment been developed in line with the ISEP Climate Change Resilience Guidance. This includes quantifying the current and future baseline climate, identifying receptors sensitive to the projected changes to climate and their level of sensitivity, determining the magnitude of impacts, and the significance of any effects.

9.4.3 To determine the existing baseline climate, climate averages from the period 1991-2020 have been sourced from the nearest meteorological site to the Proposed Development (Hawarden)[2] and Met Office UK country climate summary (Wales)[3] from the same time period, as published on the Met Office website.

9.4.4 The future baseline has been defined using UK Climate Projections 2018 (UKCP18)[4]. UKCP18 are a set of climate projections and tools to access climate data. The data used within this assessment has been extracted from the UKCP18 key results. The identified changes have then been applied to the current baseline climate conditions to give a prediction of the local future climate conditions.

[2] *Met Office. UK Climate Averages Hawarden (Flintshire). Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcmys019j [Last Accessed 16 July 2025].*
[3] *Met Office (2016). Wales: Climate. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/weather/regional-climates/wales_-climate-met-office.pdf [Last Accessed 16 July 2025].*
[4] *Met Office (August 2022). UK Climate Projections: Headline Findings – August 2022. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/summaries/headline-findings [Last Accessed 16 July 2025].*

9.4.5 The Climate Change Resilience Assessment systematically describes how each receptor could be impacted by the effects of the projected changes to climate change that have been scoped into the Climate Change Resilience Assessment.

Assessment of Significance/Assessment Criteria

9.4.6 For each receptor, the significance of each predicted effect of climate change has been assessed. This has considered the sensitivity of the receptor and the magnitude of impact.

Sensitivity

9.4.7 As per the ISEP Climate Change Resilience Guidance, the sensitivity of a receptor is *"the degree of response of a receiver to a change and its capacity to accommodate and recover from a change if it were to be affected"*. This should account for the susceptibility, vulnerability, and the value/importance of the receptor.

- Susceptibility is defined as "the ability of the receptor to be affected by a change";
- Vulnerability is defined as "the potential exposure of the receptor to a change" (the inverse of resilience); and
- Receptors are defined as "elements of the project relevant to the location, nature and scale of the development".

9.4.8 Resilience is the measure of the ability of a receptor to respond to changes in experiences. If a receptor or a project has good climate change resilience, it is able to respond to the changes in climate in a way that ensures it retains much of its original function and form. A receptor or project that has poor climate change resilience will lose much of its original function or form as the climate changes.

9.4.9 The scale of the susceptibility and vulnerability has been determined using the ISEP Climate Change Resilience Guidance as set out in **Table 9.3**.

Table 9.3 – Climate Change Receptors – Susceptibility and Vulnerability Scale

Scale	Susceptibility	Vulnerability
High	Receptor has no ability to withstand/not be substantially altered by the projected changes to the existing/prevailing climatic	Receptor is directly dependent on existing/prevailing climatic factors and reliant on these specific existing climate conditions continuing in future (e.g. river flows and

Scale	Susceptibility	Vulnerability
	factors (e.g. lose much of its original function and form).	groundwater level) or only able to tolerate a very limited variation in climate conditions
Moderate	Receptor has some limited ability to withstand/not be altered by the projected changes to the existing/prevailing climatic conditions (e.g. retain elements of its original function and form).	Receptor is dependent on some climatic factors but able to tolerate a range of conditions (e.g. a species which has a wide geographic range across the entire UK but is not found in southern Spain).
Low	Receptor has the ability to withstand/not be altered much by the projected changes to the existing/prevailing climatic factors (e.g. retain much of its original function and form).	Climatic factors have little influence on the receptors (consider whether it is justifiable to assess such receptors further within the context of EIA – i.e. it is likely that such issues should have been excluded through the EIA scoping process).

9.4.10 In addition to the susceptibility and vulnerability, the value/importance of the receptor has been used to reach a reasoned conclusion on sensitivity using professional judgement.

9.4.11 The greater the susceptibility, and/or vulnerability of the receptor, the greater the likelihood that the receptor would also be of higher sensitivity. For instance, a high-value receptor that has very little resilience to change in climate is considered to be more likely to have a higher sensitivity than a high-value receptor that is very resilient to changes in climate. The sensitivity of the receptor to the effect of climate change has been deemed to be low, medium or high. These descriptors have been determined based on professional judgement and are in line with the following examples:

9.4.12 The sensitivity of a receptor to the impacts from fluvial flooding could be described as ‘low’ under the following scenario:

- the value of the receptor is low – such as an unused non-Best and Most Versatile agricultural field;
- the vulnerability is low – as it does not lie within the flood plain so is unlikely to be impacted by fluvial flooding associated with increased rainfall as a result of climate change; and

- the susceptibility is low – as the receptor would have the ability to return to its previous use as the event would only cause temporary loss of use of the field, and damages would be limited.

9.4.13 The sensitivity of a receptor to the impacts from fluvial flooding could be described as 'medium' under the following scenario:

- the value of the receptor is high – such as a residential property;
- the vulnerability is high – as it lies within the flood plain and is likely to be impacted by fluvial flooding associated with increased rainfall as a result of climate change; and
- the susceptibility is low – as there are effective mitigation measures in place such as flood defences which would allow the property to withstand the projected increases in rainfall and associated fluvial flooding events.

9.4.14 The sensitivity of a receptor to the impacts from fluvial flooding could be described as 'high' under the following scenario:

- the value of the receptor is high – such as a residential property;
- the vulnerability is high – as it lies within the flood plain and is likely to be impacted by fluvial flooding associated with increased rainfall as a result of climate change; and
- the susceptibility is high – as there are no flood defences or on-site mitigation measures and therefore no ability to withstand fluvial flooding.

Magnitude

9.4.15 For each receptor and each identified change in climate, the magnitude of impact has been determined. As per the ISEP Climate Change Resilience Guidance, the magnitude is *"the degree of a change from the relevant baseline conditions which derives from the construction and operation of a development"*. The ISEP Climate Change Resilience Guidance explains that magnitude is based on a combination of:

- "Probability, which would take into account the chance of the effect occurring over the lifespan of the development, if the risk is not mitigated; and

- Consequence, which would reflect the scale or complexity of the effect, considering degree of harm, duration, frequency and reversibility of effect."

9.4.16 A combination of probability and consequence has been used to reach a reasoned conclusion on the magnitude of impact using professional judgement. Where a probability and/or consequence of the effect is high, then the magnitude of impact would also be high. Descriptors of negligible, small, medium and large have been used to define the magnitude of impact in line with the following examples in relation to fluvial flooding:

- A negligible magnitude of change may be used to describe a scenario where there is a low probability of a fluvial flooding occurring, the receptor is not within or close to a flood zone, and the consequence of flooding is low, for example the damage caused by fluvial flooding of a non-BMV agricultural field is minimal and reversible.
- A small magnitude of change may be used to describe a scenario where there is a low probability of a fluvial flood occurring, i.e. the receptor is not within a flood zone, but there is a higher consequence of risk, for example a residential property may undergo a small amount of damage. A small magnitude of change could also be used to describe a scenario where there is a high probability of fluvial flooding, but the consequence is low, for example the damage caused by flooding of a non-BMV agricultural field is minimal and reversible.
- A medium magnitude of change may be used to describe a scenario where there is some probability of a fluvial flood event occurring, if the receptor is within a flood zone, and there is some consequence to a flood, for example a residential property may undergo some amount of damage.
- A large magnitude of change may be used to describe a scenario where there is a high probability of a fluvial flood event occurring, if the receptor is within a flood zone particularly close to a river, and there is a likely consequence to a flood, for example a residential property may undergo significant damage.

Significant Effects

9.4.17 The level of effect is then determined, taking into account the sensitivity for each receptor and the magnitude for each climate change effect using professional

judgement. **Table 9.4** provides an example of how the sensitivity of receptor and magnitude of impact can be used to determine the significance of the effect.

Table 9.4 – Climate Change Receptors – Significance of Effect

Sensitivity of Receptor	Magnitude of Impact Descriptors			
	Negligible	Small	Medium	Large
Low	Negligible	Negligible	Negligible	Slight
Medium	Slight	Slight	Moderate	Substantial
High	Moderate	Moderate	Substantial	Substantial

9.4.18 Where a level of effect is defined as substantial then the effect is likely to be considered significant. Professional judgment is used in determining whether an effect is significant and this is consistent with the other chapters.

Baseline Environment

Current Baseline

9.4.19 The current climate baseline at the Site has been determined based on Met Office historical climate averages data from the period 1991-2020, from the closest meteorological station with this historical data, Hawarden (approximately 26km to the northeast of the Site in a straight line) and Met Office UK regional climate summaries from the same time period for Wales.

9.4.20 Full details of the baseline climate are provided in **Appendix 9A (Climate Baseline)** and summarised in **Table 9.5**.

Future Baseline

9.4.21 The future baseline has been calculated by taking the UKCP18 predictions based on the predictions for the country of Wales. The predicted changes to baseline climate are detailed within **Appendix 9A (Climate Baseline)**.

9.4.22 There are uncertainty and variability in projections but generally climate change is projected to lead to hotter Summers and warmer Winters, and generally wetter Winters and drier Summers. Projections indicate there will be an increase in near surface wind speeds over the UK and more significant impacts of wind will be experienced in the Winter months, including an increase in frequency of Winter storms.

9.4.23 A summary of the current and future baseline climate is provided in **Table 9.5** applying the central estimate which is considered to be the level at which as much evidence points to a lower outcome as a higher one. The 10th and 90th percentiles reflect the lowest and highest 10% of the model runs – the value at which 10% of the model runs fall at or below (10th percentile) or at and above (90th percentile) fall at or above. These have been considered where the direction of change is predicted to vary at each level.

Table 9.5 – Future Baseline Climate Conditions Variables

Item	Units	Current Conditions (Hawarden 1981-2010	2010-2029 Time Horizon		2030-2049 Time Horizon		2050-2069 Time Horizon	
			Predicted Change from Baseline (UKCP18)	Future Conditions	Predicted Change from Baseline (UKCP18)	Future Conditions	Predicted Change from Baseline (UKCP18)	Future Conditions
Central (50th percentile) estimate								
Mean annual temperatures	°C	10.3	0.7	11.0	1.2	11.5	2.1	12.4
Mean Winter temperatures	°C	5.2	0.5	5.7	1.1	6.3	1.8	7.0
Mean Summer temperatures	°C	15.9	0.9	16.8	1.4	17.3	2.6	18.5
Mean in Winter precipitation	mm	62.0	5.0%	65.0	6.0%	66.0	12.0%	69.0
Mean Summer precipitation	mm	61.0	-5.0%	58.0	-9.0%	56.0	-21.0%	48.0
High (90th percentile) estimate								
Mean summer precipitation	mm	61.0	12.0%	68.0	11.0%	68.0	3.0%	63.0
Low (10th percentile) estimate								
Mean Winter precipitation	mm	62.0	-7.0%	58.0	-5.0%	59.0	-4.0%	60.0

Initial Development Design and Impact Avoidance/Reduction Measures

Overview

9.4.24 General design measures to avoid or minimise the potential for significant effects are described in **ES Chapter 4.0 (Description of the Proposed Development)**.

9.4.25 Design measures to avoid or minimise the potential for significant climate change effects are summarised below.

Construction and Decommissioning

- Weather conditions will be monitored.
- RAMS will be used. RAMS are important health and safety document that are completed to identify the steps to be undertaken to carry out a specific activity or task in a safe manner such as manual handing and inspection of the boiler).
- Construction workers will all have the correct personal protective equipment (PPE), be trained in Site health and safety and be informed about protecting themselves from extreme weather conditions.
- Construction materials would be covered when stored.
- Pro-active planning will be undertaken to account for the possibility of extreme weather events, including the use of extreme weather alert systems.
- Health and safety plans developed for construction activities will be required to account for potential climate change impacts on workers, such as flooding and heatwaves.
- The materials used during construction will be resilient to expected climatic extremes with British Standards applicable for most materials to ensure that extreme climatic conditions are accounted for.

Operation

- The materials used in the plant buildings and operational equipment will be resilient to expected climatic extremes with British Standards applicable for most materials to ensure that extreme climatic conditions are accounted for.
- The ventilation system will be designed to withstand a range of temperatures greater than the currently experienced temperatures to account for climate change.

- Risk Assessment Method Statements (RAMS) will be used.
- Workers will all have the correct PPE, be trained in Site health and safety and will be informed about protecting themselves from extreme weather conditions.
- The proposed Low Carbon CHP Facility is sheltered from the wind as it is embedded within the design of the existing Kronospan Facility.
- The proposed Low Carbon CHP Facility is designed to minimise water use. Additionally, the condensate from the FGT system would be recirculated and reused in the boiler and any water not vapourised in the quenching process would be collected and recycled for continued use in the quenching process.

Assessment of Potential Effects

Introduction

9.4.26 The following section sets out the assessment of effects taking into consideration the initial development design and impact avoidance/reduction measures detailed above.

Construction and Decommissioning

9.4.27 The proposed Low Carbon CHP Facility's resilience to climate change has not been assessed during the construction phase. This is because if the proposed Low Carbon CHP Facility is consented, construction would occur in the near future when the climatic conditions are well understood and would be accounted for in the initial development design and impact avoidance/reduction measures outlined above. A Framework Construction Environmental Management Plan (CEMP) (**DNS4-003**) is provided with this DNS application and presents the approach to and the application of environmental management and mitigation for the construction of the proposed Low Carbon CHP Facility. A series of phase specific CEMP documents (as required) which define specific measures to be adopted during the construction of the various components of the Proposed Development would be produced (post-consent) by the Principal Contractor (PC).

9.4.28 In addition, the proposed Low Carbon CHP Facility's resilience to climate change has not been assessed during the decommissioning phase. This is because decommissioning of the proposed Low Carbon CHP Facility is too far in the future. A Decommissioning Environmental Management Plan (DEMP) would be prepared

in advance of decommissioning for approval which would be adapted to account for the climatic conditions at the time of decommissioning. This would include similar measures as proposed as part of the CEMP.

Operation

9.4.29 The resilience to climate change has been considered for the following vulnerable receptors in this assessment:

- Plant buildings and operation.
- Vehicular access to Site (for workers and waste).
- Grid connection and local users.
- On-site workers.

9.4.30 The following climate change effects have been considered in this assessment:

- Increased Winter precipitation, which could lead to fluvial or pluvial flooding of the Site and access.
- Increased frequency and magnitude of wind and storms which would have the potential to damage the Proposed Development and lead to obstruction of access routes.
- Decreased Summer precipitation, leading to the possibility of reduced water supply and drought.
- Increase in Summer temperatures - increases in temperatures could affect electrical infrastructure and conditions within working areas.

9.4.31 Full details of the assessment for each receptor can be found in **Appendix 9B (Climate Change Resilience Assessment)**. For each receptor and climate change effect, the following has been provided:

- A description of how the projected change in climate could affect the receptor.
- The sensitivity of the receptor to the effect taking into account the value, susceptibility and vulnerability.
- The magnitude of the impact taking into account the probability of the projected change in climate, and the consequence taking account of any mitigation measures in place.
- The resultant significance of the effect.

9.4.32 A summary of this analysis is provided in **Table 9.6** below.

Table 9.6 – Summary of Climate Change Resilience Assessment

Predicted Change in Climate	Effect	Value	Vulnerability	Susceptibility	Sensitivity	Probability	Magnitude of Impact	Overall Significance
Increased winter precipitation								
Plant buildings and operation	Flood damage to plant buildings and operational equipment	High	Low	Low	**Low**	Low	**Small**	**Negligible**
Vehicular access to the Site	Flood damage resulting in disruption to access	High	Moderate	Low	**Medium**	Low	**Small**	**Slight**
Grid connection and local users	Not likely to affect receptor							
On-site workers	Not likely to affect receptor							
Increased frequency and magnitude of wind and storms								
Plant buildings and operation	Damage to equipment	High	Low	Low	**Low**	Low	**Small**	**Negligible**
Vehicular access to the Site	Fallen trees resulting in disruption to access	High	Moderate	Low	**Medium**	Low	**Small**	**Slight**
Grid connection and local users	Not likely to affect receptor							
On-site workers	Increased risk of hazards and dangerous working conditions	High	Moderate	Low	**Medium**	Low	**Small**	**Slight**
Decreased summer precipitation								
Plant buildings and operation	Cleaning of operational equipment	High	Low	Low	**Low**	Low	**Small**	**Negligible**
Vehicular access to the Site	Not likely to affect receptor							
Grid connection and local users	Not likely to affect receptor							
On-site workers	Not likely to affect receptor, water supplier include mitigation to ensure a supply for welfare facilities							
Increases in summer temperatures								
Plant buildings and operation	Damage to equipment	High	Low	Low	**Low**	Low	**Small**	**Negligible**
Vehicular access to the Site	Not likely to affect receptor							
Grid connection and local users	Not likely to affect receptor							
On-site workers	Dangerous working conditions	High	Low	Low	**Medium**	Low	**Small**	**Negligible**

9.4.33 This analysis shows that the overall effect of climate change is negligible to slight, which is not significant. Therefore, it is considered that the Proposed Development is resilient to the effects of climate change.

Inter-Relationship of Potential Effects

9.4.34 An In-Combination Climate Change Impact Assessment (**Appendix 9D**) has been produced that considers the extent to which climate change exacerbates or ameliorates the potential effects identified within each of the technical assessments presented in each of the following technical chapters:

- ES Chapter 5.0: Noise and Vibration
- ES Chapter 6.0: Air Quality and Odour
- ES Chapter 7.0: Landscape and Visual Impact Assessment
- ES Chapter 8.0: Historic Environment
- ES Chapter 9.0: Climate Change
- ES Chapter 10.0: Waste
- ES Chapter 11.0: Population and Human Health

9.4.35 Climate change has the potential to exacerbate and/or ameliorate the potential effects identified within the technical chapters. However, the mitigation measures outlined would remain effective in the context of anticipated climate change scenarios.

Further Mitigation and Monitoring

9.4.36 This assessment has identified that the proposed Low Carbon CHP Facility would be resilient to the effects of climate change. Therefore, no further mitigation is required.

Summary of Potential Residual Effects

9.4.37 The resilience of the proposed Low Carbon CHP Facility to the effects of climate change has been considered with reference to the effects on operational equipment; vehicular access to Site; grid connection and local users; and on-site workers. The level of effect has been assessed to be negligible to slight, which is not significant.

Therefore, it is considered that the proposed Low Carbon CHP Facility is resilient to the effects of climate change.

Cumulative Effects

9.4.38 The proposed Low Carbon CHP Facility's resilience to climate change would not be impacted by other projects, on the basis that climate change adaptation effects and impacts are specific to the proposed Low Carbon CHP Facility and will not result in impacts to neighbouring development. This position is supported by the ISEP Climate Change Resilience Guidance.

Enhancement Measures

9.4.39 No enhancement measures are required in relation to climate change resilience.

9.5 GHG Emissions Assessment

Assessment Methodology

Overview

9.5.1 The ISEP GHG Emissions Guidance acknowledges that there are many different methods available for measuring and quantifying GHG emissions. However, the guidance provides a framework of six steps that have been incorporated into the assessment, as follows:

- 1. Set the scope and boundaries of the assessment. These include system boundaries and temporal boundaries.
- 2. Develop the baseline. This includes the current, future and alternative baselines.
- 3. Decide upon the assessment methodologies. The methodology should result in a relevant, complete, consistent, transparent and accurate assessment of the reasonable worst case.
- 4. Data collection. Activity data for the Proposed Development and GHG emissions factors should be collated.
- 5. Calculate the GHG emissions inventory. Although the quantification of GHG emissions for an EIA may vary in methodology and approach between projects, it is expected that in almost all cases, a calculated (not measured) approach is taken because these are completed in advance of the Proposed Development commencing. It is recommended that the following structure should be used to calculate GHG emissions: GHG emission/removal = GHG emission factor × activity data. Both annual and lifetime GHG emissions should be calculated and reported. In addition, as part of this inventory, uncertainty should be considered.
- 6. Mitigation opportunities. Once the magnitude of emissions has been determined, mitigation measures should be considered.

9.5.2 In line with the Scoping Direction, this assessment has considered the net change in GHG emissions associated with the operation of the proposed Low Carbon CHP Facility from the alternative baseline.

9.5.3 The Applicant has provided data and information that underpins the calculation, which has been evaluated, and emission factors have been used from appropriate

sources. The sources of the data used are referenced within **Appendix 9C (GHG Emissions Assessment)**.

Assessment of Significance/Assessment Criteria

9.5.4 In terms of significance, the ISEP GHG Emissions Guidance states that:

"When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however; some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its life time, which may be positive, negative or negligible".

9.5.5 The key goal of EIA is *"to inform the decision maker about the relative severity of environmental effects such that they can be weighed in a planning balance".* Therefore, it is essential to provide context for the magnitude of GHG emissions.

9.5.6 The crux of a significant effect occurring is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a science-based 1.5°C transition towards net zero which the UK Government has committed to achieve by 2050. The ISEP GHG Emissions Guidance sets out the significance criteria as 'major adverse', 'moderate adverse', 'minor adverse', 'negligible', and 'beneficial', with examples to distinguish significance listed as follows:

- Major adverse: the project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
- Moderate adverse: the project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
- Minor adverse: the project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design

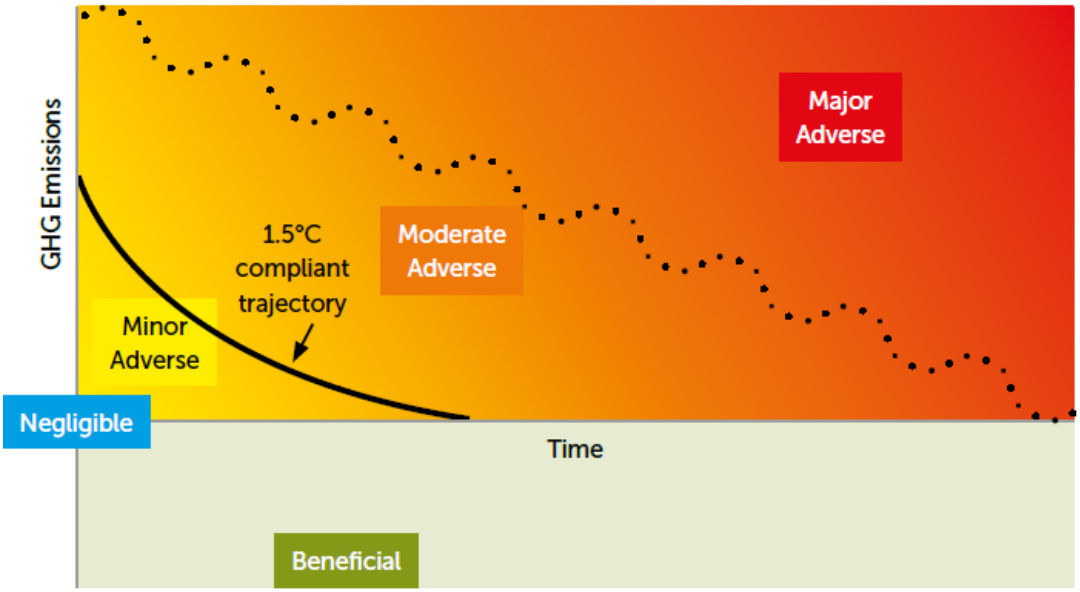
standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.

- Negligible: the project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.
- Beneficial: the project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

9.5.7 Major or moderate adverse and beneficial effects are considered to be significant. Minor adverse and negligible effects are not considered to be significant.

9.5.8 Accordingly, an assessment of the contribution of the Proposed Development towards the net zero trajectory (in accordance with the budgeted, science based 1.5 C trajectory) and the significance of the contribution has been undertaken and presented within this assessment. **Inset 9.1** is displayed in the ISEP GHG Emissions Guidance as a visualisation of how to determine the significance of the GHG emissions from the Proposed Development in the context of the net zero trajectory. The 'wavy' line indicating the distinction between a moderate adverse and major adverse effect.

Inset 9.1 – Net Zero Trajectory Context from ISEP GHG Emissions Guidance



9.5.9 The ISEP GHG Emissions Guidance states that: *"a modification to this approach is required for the very largest-scale developments, those that in themselves have magnitudes of GHG emissions that materially affect the UK's or a devolved administration's total carbon budget. An indicative threshold of 5% of the UK or devolved administration carbon budget in the applicable time period is proposed, at which the magnitude of GHG emissions irrespective of any reductions is likely to be significant".* This approach has also been considered within this assessment, in addition to the previously described approach to determining likely significant effects.

9.5.10 The ISEP GHG Emissions Guidance sets out 'good practice' approaches to contextualising a projects carbon emissions by comparing to sector-based, local, and/or national carbon budgets, policy goals and/or performance standards. Based on this, the emissions associated with the Proposed Development have been compared to the UK carbon budgets for the periods 2023-2027, 2028-2032 and 2033-2037. It is noted that the Sixth Carbon Budget only reaches to 2037. The Seventh Carbon Budget was published in February 2025. It has been recommended by the Climate Change Committee (CCC) but has not yet been legislated. The Seventh Carbon Budget covers the five-year period 2038-2042 and lays out the emissions envelope, the pathway and the main actions the UK will need to reach Net Zero by 2050. It sets out that the Seventh Carbon Budget will be delivered through:

electricity, low-carbon fuels and carbon capture and storage (CCS), nature, engineered removals, and demand. The largest share of emissions reduction during the budget period is delivered from electrification and low-carbon electricity supply.

9.5.11 Future continuation in the reduction of these budgets is expected in order to reach net zero by 2050.

9.5.12 The emissions associated with the Proposed Development have also been compared to Wales' carbon budgets. Wales' carbon budgets are presented as a percentage reduction from 1990 levels. The CCC Carbon Budget 4 explains that in 2022 emissions in Wales were 35.7 $MtCO_2e$, 37% lower than levels in 1990. Based on this, the carbon budgets expressed on a $MtCO_2e$ basis are as follows:

- Carbon Budget 1 (2016-2020) – 43.6 $MtCO_2e$;
- Carbon Budget 2 (2021-2025) – 35.7 $MtCO_2e$;
- Carbon Budget 3 (2026-2030) – 23.8 $MtCO_2e$; and
- Carbon Budget 4 (2031-2035) – 73% lower than 1990 levels – 15.3 $MtCO_2e$ (recommended by CCC like the Seventh Carbon Budget in the UK).

Baseline Environment

9.5.13 The goal of establishing a baseline is being able to assess and report the net GHG emissions associated with the Proposed Development.

9.5.14 The ISEP GHG Emissions Guidance defines the baseline as a reference point against which the impact of a project can be compared against (sometimes referred to as 'business as usual' or 'BaU', where assumptions are made on current and future GHG emissions).

9.5.15 However, as per the Scoping Direction response from PEDW, the net difference in emissions have been calculated.

Initial Development Design and Impact Avoidance/Reduction Measures

Overview

9.5.16 General design measures to avoid or minimise the potential for significant effects are described in **ES Chapter 4.0 (Description of the Proposed Development).**

9.5.17 Design measures to avoid or minimise the potential for significant climate change effects are summarised below.

Construction and Decommissioning

- The proposed Low Carbon CHP Facility will employ good industry practice measures such as optimising the use of resources and minimising carbon throughout the value chain.
- Vehicles will be switched off when not in use and construction vehicles will be checked to ensure they conform to current UK emissions standards.
- Regular planned maintenance of the construction plant and machinery will be carried out to optimise efficiency.
- The proposed Low Carbon CHP Facility will be designed and constructed in such a way as to minimise the creation of waste and maximise the use of alternative materials with lower embodied carbon, such as locally sourced products and materials with a higher recycled content where feasible.
- Suitable infrastructure and resources already available within the existing Kronospan Facility would be reused where possible to minimise the use of natural resources and unnecessary materials.
- Recyclability would be increased by segregating construction waste to be re-used and recycled where reasonably practicable.

Operation

- The proposed Low Carbon CHP Facility will be operated in such a way as to minimise the creation of waste.
- The proposed Low Carbon CHP Facility will use biomass predominately sourced from on-site operations providing an on-site solution for the re-use of material.

Assessment of Potential Effects

Introduction

9.5.18 The following section sets out the assessment of effects taking into consideration the initial development design and impact avoidance/reduction measures detailed above.

Construction and Demolition - Approach

9.5.19 To construct the proposed Low Carbon CHP Facility, existing infrastructure would need to be removed from Site. At this stage it is not possible to fully quantify all GHG emissions associated with these works. However, as an estimate of the likely GHG emissions associated with this stage, the following have been considered:

- Indirect GHGs associated with the demolition of existing equipment and buildings needed to facilitate the development of the proposed Low Carbon CHP Facility;
- Indirect GHGs associated with the transportation of waste material from Site;
- Indirect GHGs associated with the construction of the proposed Low Carbon CHP Facility; and
- Indirect GHGs associated with the transportation of construction materials to Site.

9.5.20 Full details of the inputs into the GHG Emissions Assessment inputs can be found in **Appendix 9C (GHG Emissions Assessment)**.

Operation - Approach

Overview

9.5.21 Full details of the inputs into the GHG Emissions Assessment inputs can be found in **Appendix 9C (GHG Emissions Assessment)**.

9.5.22 The Site benefits from planning permission for an Orientated Strand Board (OSB) process which is not yet operational. This forms the future baseline. A review of all the sources of GHG emissions associated with the operation of the proposed Low Carbon CHP Facility, and the alternative solutions is provided in **Section 2, Appendix 9C (GHG Emissions Assessment).** This has been used to determine where there is likely to be a change in GHG emissions. The calculation has then focussed on the net change in emissions to allow for a comparison with the Carbon Budgets. This has included (but not limited to) the following:

- Direct GHGs from the combustion of residues from the increase in on-site production in the proposed Low Carbon CHP Facility.

- Indirect GHGs associated with the production of FGT reagents required on-site based on the quantity of biomass combusted in the K7 Biomass Plant (which currently does not include a FGT system), which would be combusted in the proposed Low Carbon CHP Facility.
- Indirect GHGs associated with the transportation of materials associated with the increased on-site production.
- Indirect GHGs associated with the transportation of the additional FGT reagents.

9.5.23 In addition to the above, the following net GHG emissions would be avoided as a result of the Proposed Development:

- The offset of GHG emissions associated with the combustion natural gas in the on-site gas engines based on the change in gas use.
- Indirect GHGs associated with the transportation of existing on-site process residues currently sold to an alternative electricity generation plant.
- The offset of indirect GHG emissions associated with the electricity being produced from an alternative biomass facility processing the existing on-site process residues currently sold and this being exported to the national grid.

Decommissioning - Approach

9.5.24 When required to be decommissioned, the proposed Low Carbon CHP Facility and associated infrastructure would need to be removed from Site. At this stage it is not possible to fully quantify all GHG emissions associated with these works. However, as an estimate of the likely GHG emissions associated with this stage the following have been considered:

- Indirect GHGs associated with the decommissioning of the proposed Low Carbon CHP Facility; and
- Indirect GHGs associated with the transportation of materials from the Site.

9.5.25 Full details of the inputs into the GHG Emissions Assessment inputs can be found in **Appendix 9C (GHG Emissions Assessment)**.

Effects

Annual and Lifetime GHG Emissions

9.5.26 The Proposed Development would result in a net reduction in GHG emissions of ~46,000 tCO_2e/yr (this includes consideration of the GHG emissions associated with the construction, operation and decommissioning), or 46,000 tCO_2e/yr during the operational phase This is based on the residues currently sold offsite being used to generate electricity in a biomass facility and this producing low-carbon electricity which would displace electricity generated by CCGT.

9.5.27 DEFRAs 'Energy from Waste – A Guide to the Debate 2014' (specifically, footnote 29 on page 21) states that "*A gas fired power station (Combined Cycle Gas Turbine – CCGT) is a reasonable comparator as this is the most likely technology if you wanted to build a new power station today*". Therefore, the assessment of grid offset uses the current marginal technology as a comparator.

9.5.28 It is acknowledged that the UK government has set a target which will require the UK to bring all GHG emissions to net zero by 2050. Taking this into consideration, in the future, it is anticipated that the electricity which the residues currently sold could generate would displace other forms of power generation, including renewable energy power stations. However, at this stage the mix of future generation capacity additions to the grid that might be displaced by the project is uncertain, and the emissions intensity of future displaced generation cannot be accurately quantified. Therefore, for the purposes of this assessment, it has been assumed that the residues currently sold would be used in a biomass plant and displace a CCGTs as this is considered a reasonable comparator. However, the effect of changing the grid offset displacement factor has been considered when assessing the lifetime impact of the GHG emissions where the effect of a gradually decarbonising grid has been considered.

9.5.29 Two alternative future baseline marginal power sources have been established using the DESNZ publication "Green Book supplementary guidance: valuation of energy use and GHG emissions for appraisal".

- The first assumes that the long run marginal emission factors, generation-based, should be used.

- The second assumes that the power displaced will decarbonise less quickly than the long run marginal emissions factor because, power generated from a biomass facility operating at baseload will not displace other renewable power sources such as wind and solar until there is an excess of such power on the grid.

9.5.30 Using the long run marginal figures for grid displacement, during the operational phase the cumulative benefit of the Proposed Development assuming a 40-year lifetime is predicted to be **3,113,208 tCO_2e**, or an average of **78,330 tCO_2e/a**, compared to the baseline scenario. Using the adjusted figures for grid displacement, the cumulative benefit of the Proposed Development is predicted to be **3,036,585 tCO_2e**, or an average of **75,915 tCO_2e/a**, compared to the baseline scenario.

9.5.31 Allowing for the GHG emissions associated with the construction and decommissioning phases the cumulative benefit of the Proposed Development assuming a 40-year lifetime is predicted to be **3,121,362 tCO_2e**, or an average of **78,034 tCO_2e/a**, compared to the baseline scenario. Using the adjusted figures for grid displacement, the cumulative benefit of the Proposed Development is predicted to be **3,024,740 tCO_2e**, or an average of **75,618 tCO_2e/a**, compared to the baseline scenario. Including the construction and decommissioning phases results in a 0.4% reduction in the benefit of the Proposed Development just considering operational phase emissions – i.e. a marginal change.

Comparison to Carbon Budgets

9.5.32 The net change in GHG emissions have been compared to the carbon budgets for the UK, Wales and Wrexham.

9.5.33 The Climate Change Act 2008 requires the UK Government to set legally binding 'carbon budgets' to act as stepping stones towards 2050. The UK carbon budgets have not yet been set beyond 2037. The next budget, the seventh carbon budget, is due to be set in 2026 and will cover the period 2038 to 2042. The budgets will gradually reduce with the aim of achieving net zero by 2050. The UK carbon budgets are set out in **Table 9.7**.

Table 9.7 – UK Carbon Budgets

Carbon Budget Period	Budget ($MtCO_2e$)
2023 – 2027 (Fourth Carbon Budget)	1,950
2028 – 2032 (Fifth Carbon Budget)	1,725
2033 – 2037 (Sixth Carbon Budget)	965
2038 – 2042 (Seventh Carbon Budget)	535
Note: 1 Mt = 1,000,000 tonnes.	

Source: Carbon Budget Order 2011, 2016 and 2021 and the Seventh Carbon Budget.

9.5.34 Wales' carbon budgets are presented as a percentage reduction from 1990 levels. The CCC Carbon Budget 4 explains that in 2022 emissions in Wales were 35.7 MtCO2e, 37% lower than levels in 1990. Based on this, the carbon budgets expressed on a $MtCO_2e$ basis in **Table 9.8**.

Table 9.8 – Wales' Carbon Budgets

Carbon Budget Period	Reduction on 1990 Levels	Calculated Budget ($MtCO_2e$)
2016-2020	23%	43.6
2021-2025	37%	35.7
2026-2030	58%	23.8
2031-2035	73%	21.0
Note: 1 Mt = 1,000,000 tonnes.		

Source: Welsh Government and CCC

9.5.35 **Table 9.9** and **Table 9.10** provide a comparison of the net GHG emissions with the relevant budget for UK and Wales respectively. This is based on the conservative assumption and more realistic assumption that the displaced GHG emissions as a result of generating power from the on-site residues in an alternative biomass plant is the adjusted value rather than the long-run marginal factor from the DESNZ green book. These include the GHG emissions associated with the construction and decommissioning of the Proposed Development in the relevant budget period.

Table 9.9 – Comparison with the UK Carbon Budgets

Carbon Budget Period	Emissions (tCO_2e)	Percentage of UK Carbon Budget (%)
2023 - 2027	- 89,202	- 0.005%
2028 - 2032	- 303,898	- 0.02%
2033 - 2037	- 383,157	- 0.04%
2038 – 2041	- 399,770	- 0.07%

Table 9.10 – Comparison with the Welsh Carbon Budgets

Carbon Budget Period	Emissions (tCO_2e)	Percentage of Welsh Carbon Budget (%)
2026-2030	- 261,107	- 1.10%
2031-2035	- 356,838	- 2.33%

9.5.36 The ISEP GHG Emissions Guidance 2022 states that projects that contribute over 5% of the UK's or a devolved administrations total carbon budget are likely to be significant irrespective of any reductions.

9.5.37 The Proposed Development would negate GHG emissions with reference to the carbon budgets. The reduction in GHG emissions will be less than 5% of the UK and Wales currently legislated budgets and therefore be not significant.

Policy

9.5.38 Both Welsh and UK legislation, policy and guidance documents support electricity generation using low carbon sources as a key component of the transition to net zero. Without low-carbon electricity generation projects such as the Proposed Development, the GHG intensity of the electricity grid will not be able to decrease in line with the projections required to achieve both the UK's and Wales's net zero target of 2050.

9.5.39 Additionally, the Proposed Development aligns with circular economy principles outlined in both Welsh and UK legislation, policy and guidance documents. The Proposed Development will transform biomass and waste wood into electricity to be used in the electricity grid. The Proposed Development therefore keeps biological materials in use for as long as possible, reduces reliance on fossil fuels, and closes nutrient and energy loops, which are key goals of a circular economy.

Summary

9.5.40 The Proposed Development would result in a net carbon benefit of ~3,024,740 tCO_2e over its lifetime, provides carbon benefits throughout each carbon budget period considered, and is consistent with existing and emerging policy requirements. Therefore, it is considered the Proposed Development would have a significant beneficial effect on climate change.

Inter-Relationship of Potential Effects

9.5.41 The GHG Emissions Assessment quantifies the GHG emissions in relation to the carbon budgets; the quantity of GHG emissions would not result in inter-related effects on any other topics or receptors.

Further Mitigation and Monitoring

9.5.42 This assessment has identified that the Proposed Development is resilient to the effects of climate change and has a net carbon benefit over its lifetime. Therefore, no further mitigation is required.

Summary of Potential Residual Effects

9.5.43 The Proposed Development is resilient to the projected effects of climate change. In addition, the Proposed Development has a net carbon benefit of 1,327,360 tCO_2e over its lifetime, it provides carbon benefits throughout each carbon budget period considered and is consistent with existing and emerging policy requirements. Therefore, it is considered the Proposed Development has a significant beneficial effect on climate change.

Cumulative Effects

9.5.44 There is the potential for the effects of the Proposed Development to interact with the effects of other projects or activities in the surrounding area. These are 'inter-project' cumulative effects and includes projects that are under construction, projects that are approved but awaiting implementation, and projects awaiting determination within the planning process with design information in the public domain. Such projects are required to be within a geographical scope where environmental impacts could act together to create a more significant overall effect on a receptor and where sufficient environmental information is available.

9.5.45 In terms of cumulative effects with other developments, as the impact of GHG emissions is on a global scale rather than affecting one localised area, the approach to cumulative assessment differs from that for many other environmental topics. Therefore, rather than assessing impacts in combination with other local developments, the Proposed Development's contribution to national and local carbon budgets has been determined instead. This position is supported by the ISEP GHG Emissions Guidance. In addition, consideration has been given to the carbon emissions associated with the OSB process which has planning consent but is not yet operational. This demonstrates that the Proposed Development will result in emission reductions. The net GHG emission reductions are not significant with respect to the UK or Wales carbon budgets but are significant with respect to Wrexham's carbon budgets.

Enhancement Measures

9.5.46 No enhancement measures are required in relation to GHG.

9.6 Conclusions

9.6.1 The resilience of the Proposed Development to the effects of climate change has been assessed to be negligible to slight, which is not significant. Therefore, it is considered that the Proposed Development would be resilient to the effects of climate change and no further mitigation measures are recommended.

9.6.2 The Proposed Development would have a significant beneficial effect on climate change. The Proposed Development would provide a net carbon benefit over its lifetime, providing carbon benefits throughout each of the carbon budget period considered, and would be consistent with existing and emerging policy requirements.

Appendix 9A – Climate Baseline

Appendix 9B – Climate Change Resilience Assessment

Appendix 9C – Greenhouse Gas Emissions Assessment

Appendix 9D – In-Combination Climate Change Impact Assessment