Ansty Garden Community

Environmental Statement

Volume 2

November 2023

CHAPTER 12: CLIMATE CHANGE MITIGATION AND ADAPTATION

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12 Climate Change Mitigation and Adaptation

12.1 Scope of the Assessment

12.1.1 This chapter of the ES assesses the likely significant climatic effects of the Proposed Development and Parkland Reserve Site in terms of climate change and is supported by **ES Volume 4, Appendix H**.

12.1.2 The chapter describes: the assessment methodology; the baseline conditions currently existing at the Site and in the surrounding area; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; the likely residual effects after these measures have been employed; and the cumulative effects associated with the Proposed Development in combination with other developments within 5 km of the Site.

12.1.3 This chapter will consider:

- Climate change mitigation (greenhouse gas (GHG) emissions) (i.e. acknowledging that all GHG emissions play a part cumulatively in climate change and identifying ways in which these can be reduced); and
- Climate change resilience (i.e. the measures the Proposed Development will use to adapt to the manifestations of a changing climate).

12.1.4 The Institute of Environmental Management and Assessment (IEMA) has developed a framework for assessing greenhouse gas emissions and assessing their significance[1] and a methodology for assessing and climate change adaptation[2] .

12.1.5 To reflect these two sets of guidance, this chapter is structured so that after a combined chapter introduction and legislation / policy section, the two distinct elements (the assessment of climate change mitigation and climate change resilience) are covered separately under the following sections of this chapter:

- Assessment methodology;
- Baseline assessment and identification of key receptors;
- Identification of changes likely to generate effects;
- Assessment of likely significant environmental effects (including embedded mitigation);
- Scope for additional mitigation measures;

[1] IEMA (2022) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance

[2] IEMA (2020) Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation

- Residual effects;
- Cumulative effects; and
- Summary and Conclusions.

12.1.6 This chapter will also consider 'in-combination climate impacts' (ICCI), as laid out in the IEMA Climate Change Resilience and Adaptation Guidance (2020)[2]. This assessment outlines how climate change has been considered in relation to effects outlined within the other ES chapters.

12.1.7 'Intra-project effects' which are the combined effects of individual topic impacts on a particular sensitive receptor are considered in **Chapter 14: Effect Interactions.**

12.2 Key Legislation, Policy and Guidance Consideration

Legislation and Regulation

Climate Change Act 2008 (2019 Target Amendment Order) (Act)

12.2.1 The Climate Change Act 2008[3] sets up a framework for the UK to achieve its long-term goals of reducing GHG emissions by 100% by 2050 and to ensure steps are taken towards adapting to the impact of climate change. The Act introduces a system of carbon budgeting which constrains the total amount of emissions in a given time period and sets out a procedure for assessing the risks of the impact of climate change for the UK, and a requirement on the Government to develop an adaptation programme.

12.2.2 The Act introduced new powers and duties on climate change adaptation and mitigation. For adaptation, it established a:

- UK-wide Climate Change Risk Assessment that must take place every five years;
- National Adaptation Programme which must be put in place and reviewed every five years to address the most pressing climate change risks;
- Government power to require 'bodies with functions of a public nature' and 'statutory undertakers' – for example, water and energy utilities – to report on how they have assessed the risks of climate change to their work, and their response;
- Adaptation Sub-Committee of the independent Committee on Climate Change (CCC) in order to oversee progress on the national programme and advise on the risk assessment; and
- Legally binding 'net zero' 2050 target.

[3]HMSO (2008): Climate Change Act 2008 (2050 Target Amendment) Order 2019.

The UK Climate Change Risk Assessment 2022 (CCRA3)

12.2.3 The third Climate Change Risk Assessment (CCRA3)[4] was published in January 2022. The Technical Report for the CCRA3 identifies sixty-one climate risks cutting across multiple sectors of our society. Based on the urgency scoring exercise, thirty-four risks are assessed as 'more action needed' at a UK-wide level. This means that new stronger or different government action is required in the next five years over and above those already planned.

12.2.4 Twenty risks are assessed as requiring 'further investigation' at the UK-wide level. Four risks were assessed as 'sustain current action' at the UK-wide level. Three risks were assessed as 'watching brief' at the UK-wide level and there are eight priority risk areas that require the most urgent UK-wide action over the next two years.

12.2.5 **Table 12.1** below shows the climate change risks pertaining to England, in relation to health, communities, and the built environment, which is considered the most relevant for the Proposed Development.

Table 12.1: Priority risk areas as per the third UK Climate Change Risk Assessment (CCRA3)

Priority Risk Area	Magnitude of Risk	Key Policy Areas
Risks to people and the economy from climate related failure of the power systems	High	Infrastructure Energy Net Zero
Risks to human health, wellbeing and productivity from increased exposure to heat in homes and other buildings	High	Building regulations and strategies planning reform

The United Nations Paris Agreement

12.2.6 The United Nations Paris Agreement[5] is a legally binding international treaty. It is an agreement negotiated under the United Nations Framework Convention on Climate Change (UNFCCC) aimed at addressing climate change and its impacts, and adopted on December 12th, 2015, during the 21st Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) in Paris, France.

12.2.7 Its main commitments include limiting global warming to well below 2 degrees Celsius above pre-industrial levels, with an aspirational target of limiting it to 1.5 degrees Celsius, and introducing Nationally Determined Contributions (NDCs), which

[4] HM Government (2022): UK Climate Change Risk Assessment 2022

[5] https://www.un.org/en/climatechange/paris-agreement

are specific targets and actions (NDC) that each country needs to submit to reduce greenhouse gas emissions and enhance resilience to climate change.

Planning Policy

National Planning Policy Framework

12.2.8 The National Planning Policy Framework (NPPF) (2019)[6] describes ways in which the challenge of climate change can be met. It states that *"new development should be planned for in ways that:*

- *avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and*
- *can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards."*

12.2.9 To help increase the use and supply of renewable and low carbon energy and heat, plans should:

- *"provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);*
- *consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and*
- *identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers".*

12.2.10 The NPPF was last revised in September 2023[7], placing a greater impetus on sustainable development. Section 2 'Achieving Sustainable Development', paragraph 11 reads:

"all plans should promote a sustainable pattern of development that seeks to: meet the development needs of their area; align growth and infrastructure; improve the environment; mitigate climate change (including by making effective use of land in urban areas) and adapt to its effects".

[6] National Planning Policy Framework (NPPF) 2019

[7] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1182995/NPPF_Sept_23.pdf

12.2.11 Chapter 14 'Meeting the Challenge of Climate Change: Flood Risk', paragraph 161 refers to developments in the areas at risk of flooding and specifies that:

'plans should now not only use opportunities provided by new development to reduce the causes and impacts of flooding but also use 'improvements in green and other infrastructure' as well as 'making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management.'

Planning Practice Guidance

12.2.12 The Planning Practice Guidance (PPG)[8] supports the NPPF. The climate change section of the PPG states:

- *"In addition to supporting the delivery of appropriately sited green energy, effective spatial planning is an important part of a successful response to climate change as it can influence the emission of greenhouse gases. In doing so, local planning authorities should ensure that protecting the local environment is properly considered alongside the broader issues of protecting the global environment. Planning can also help increase resilience to climate change impact through the location, mix and design of development."*

Mid Sussex District Local Plan 2001-2031

12.2.13 The Mid Sussex District Plan[9] was adopted in March 2018. It sets out the vision, strategy and policy framework for the District, for the period 2001-2031. The policies for climate change include DP39: Sustainable Design and Construction; DP398: Biodiversity; DP40-renewable energy schemes; DP41: Flood Risk and Drainage; and DP42: Water Infrastructure and Water Environment).

12.2.14 All development in its design, construction, operation and use will be expected to contribute to the reduction of carbon emissions, increase resilience to the impacts of climate change and improve sustainability. Applicants will need to consider:

- Energy efficiency;
- Water efficiency;
- Use of renewable resources;
- Incorporation of sustainable drainage systems; and
- Biodiversity conservation.

[8] Ministry of Housing, Communities & Local Government, Climate Change Planning Practice Guidance, https://www.gov.uk/guidance/climate-change

[9] https://www.midsussex.gov.uk/media/3406/mid-sussex-district-plan.pdf

12.2.15 The District Council is in the process of reviewing and updating the Plan where necessary. The new District Plan 2021 – 2039 will replace the current adopted District Plan.

Mid Sussex District Plan 2021-2039 Consultation Draft

12.2.16 The draft District Plan 2021-2039 was published for Regulation 18 public consultation between 7th November and 19th December 2022, and is expected to be fully adopted in 2024.

12.2.17 The Regulation 18 draft District Plan 2021-2039 includes updated and new planning policies, including for climate change (policies DPS1: Climate Change; H4: Sustainable Design and Construction; DPS3: Renewable and Low Carbon Energy Schemes; DPS4: Flood Risk and Drainage; and DPS5: Water Infrastructure and the Water Environment).

12.2.18 Applicants will need to consider climate change at an early stage and incorporate measures to:

- Reduce carbon emissions;
- Maximise carbon sequestration; and
- Adapt to and mitigate for climate change.

12.2.19 Additionally, Applicants are encouraged to consider supplementary measures to further these objectives:

- Measures that move towards zero carbon development;
- Energy efficiency;
- Preventing overheating;
- Water resources and water efficiency:
- Soil protection; and
- Minimising waste.

Mid Sussex District Council: Sustainable Economy Strategy

12.2.20 In recognition of the climate emergency, MSDC launched its Sustainable Economy Strategy[10] in April 2022 to support sustainable economic growth in Mid Sussex. The new strategy sets out how sustainable development in Mid Sussex can provide economic prosperity while supporting MSDC's journey to carbon net-zero.

12.2.21 The commitments relative to climate change include the following priorities:

[10] https://www.midsussex.gov.uk/media/8159/ses-document-2022-combined-05-05-22.pdf

- to mitigate effects of climate change by reducing carbon emissions (aligning with the council-only annual net zero pathway target);
- to adapt and be resilient to a changing climate;
- to use sustainable resources; and
- to support and grow local green economy.

12.2.22 : The strategy is supported by a delivery plan that outlines priority actions taken / to be taken by MSDC from 2022 to 2025. These actions include:

- Sustainability Requirements for Residential Developments: Ensuring that all new residential development proposals (both residential and non-residential) and major residential refurbishments meet the sustainability rating policy requirements outlined in the District Plan. This involves identifying standards for residential construction and refurbishment sustainability ratings and incorporating a policy framework in the updated District Plan to reduce carbon emissions.
- Electric Vehicle (EV) Charging Standards: Reviewing the evidence base for the District Plan Review and, if supported by evidence, establishing policies that specify standards for providing EV charging infrastructure in new developments, both speculative planning applications and future allocations within the District Plan. This aims to promote the use of sustainable transportation.
- Enhancing Biodiversity and Nature Recovery: Developing and implementing policies that promote significant improvements in biodiversity and nature recovery within new developments and land management.

Technical Standards and Guidance

The Sixth Carbon Budget

12.2.23 The Sixth Carbon Budget[11], produced by the Committee on Climate Change (CCC), reported that the Sixth Carbon Budget (i.e. the legal limit for UK net emissions of greenhouse gases over the years 2033-37) has been set at 965 MtCO2e, implying a 78% reduction from 1990 to 2035.

UK GHG Statistics

12.2.24 The Department for Business, Energy, and Industrial Strategy (BEIS) reports on energy and emissions projections by source, and reports on GHG emissions from a

[11] Committee on Climate Change (2020): The Sixth Carbon Budget, UK, Committee on Climate Change

geographical perspective[12]. This allows a review of trends over the period 2005-2018 for a particular Local Authority to be undertaken. They have also published conversion factors for GHG reporting[13] .

WebTAG Data Book

12.2.25 The Department for Transport produces transport analysis guidance (TAG)[14] on how the UK's modal mix (diesel, petrol, electric) will change over time, as well as carbon dioxide emissions for different transportation modes (and projections for future efficiency).

One Click LCA Software

12.2.26 One Click LCA (Life Cycle Assessment (LCA)) Software[15] developed by Bionova Ltd has been used to calculate the environmental impacts, in the form of tonnes of carbon dioxide equivalent (tCO2e) from the embodied carbon in the construction of the Proposed Development. It is possible to calculate the LCA life cycle of a building to find out how it will affect the environment through its whole existence, from extraction of raw materials to construction phase, use, and finally demolition and disposal[16].

Tyndall Carbon Budget Tool

12.2.27 The Tyndall Carbon Budget Tool[17] presents climate change targets for UK local authority areas including Mid Sussex County that are based on the commitments in the United Nations Paris Agreement[18], informed by the latest science on climate change and defined by science-based carbon budget setting.

BS EN 15978 – Environmental Performance Standard

12.2.28 BS EN 15978[19] is a European Standard that pertains to the assessment of the environmental performance of buildings and building products using a method

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[12] Department for Business, Energy & Industrial Strategy (2017): UK local authority and regional carbon dioxide emissions national statistics:(https://www.gov.uk/government/collections/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics)

[13] Department for Business, Energy & Industrial Strategy (2017): GHG reporting: conversion factors 2017

[14] Department for Transport (2017): WebTAG Transport Analysis Guidance data book, December 2017

[15] One Click LCA, Bionova Ltd 2018

[16] One Click LCA, 10 essential facts about building life cycle assessment

[17] Tyndall Centre: The Tyndall Carbon Budget Tool

[18] https://www.un.org/en/climatechange/paris-agreement

[19] https://www.en-standard.eu/bs-en-15978-2011-sustainability-of-construction-works-assessment-of-environmentalperformance-of-buildings-calculation-method/

known as Life Cycle Assessment (LCA). This standard provides guidelines and principles for evaluating the environmental impacts associated with the entire life cycle of buildings, from their construction and use to maintenance, renovation, and eventual demolition.

BS 8001:201 – Circular Economy Standard

12.2.29 BS 8001:2017[20] is the British Standard for "Framework for implementing the principles of the circular economy in organisations - Guide." It is a guidance document that provides organizations with a framework for implementing the principles of the circular economy into their operations and business practices. The circular economy is an economic model that seeks to maximize the use of resources, minimize waste, and promote sustainability by keeping products, materials, and resources in use for as long as possible.

IEMA Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance

12.2.30 The approach to assessing the potential impact of the Proposed Development on climate change will follow the IEMA guidance 'Assessing Greenhouse Gas Emissions and Evaluating Their Significance' (2022)[21] (the 'IEMA GHG Guidance 2022').

12.2.31 This guidance describes how a proportionate assessment of a development's potential impact on climate can be achieved and how to communicate the results in terms of a notional percentage contribution relative to a carbon budget, accounting for achievable mitigation. Key updates from the 2017 guidance[22] include:

- Mitigation should be considered from the outset and throughout the project's lifetime;
- Relative significance descriptions to assist assessments; and
- Five distinct levels of significance which are not solely based on whether a project emits GHG emissions alone, but how the project makes a relative contribution towards achieving a science-based 1.5°C aligned transition towards net zero.

[20] https://knowledge.bsigroup.com/products/framework-for-implementing-the-principles-of-the-circular-economy-in-organizations-guide?version=standard

[21] IEMA (2022) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance

[22] IEMA (2017) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance

IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation

12.2.32 IEMA has developed a framework for considering climate change resilience and adaption within the EIA process in line with the 2014 European Union Directive. The guide is designed to ensure that both climate change resilience and adaption is incorporated in any future developments in the UK.

12.2.33 This guide[23] was updated in June 2020, adding two new procedural steps which should be followed in the EIA process. This guidance laid emphasis on the difference between assessing the impacts of climate change on a project (climate change resilience assessment) and assessing the impacts of climate change on the effects of a project on other environmental receptors. This is described further in Section 12.3 (Assessment Methodology)

12.3 Assessment Methodology

12.3.1 The Proposed Development and Parkland Reserve Site have been considered holistically within this assessment and ES chapter; however, the Parkland Reserve Site is not anticipated to provide any additional notable vehicle movements during the construction and operation of the Parkland Reserve Site. Consequently, the effects of the Proposed Development (during both construction and operation) are considered to be representative of the Proposed Development and the Parkland Reserve Site.

Climate Change Mitigation (GHG Emissions)

12.3.2 The methodology applied to the climate change mitigation assessment follows the IEMA GHG Guidance 2022[21]. The significance criteria used for this assessment was determined using expert judgment.

12.3.3 The goal and scope of undertaking this assessment is to:

- Identify the existing sources of GHG currently at the Site, and consider how these may change under a worst-case scenario;
- Identify the likely sources of GHG emissions arising from the construction, operation and decommissioning of the Proposed Development, and quantify them as far as practical; and
- Consider mitigation measures in which different alternatives (such as development type, construction methodology, operating mechanisms, and end of life uses) can demonstrably reduce GHG emissions.

[23] IEMA (2020) Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation

Determination of Baseline

12.3.4 The Site comprises agricultural fields divided by hedgerows and ditches across a stream valley. There is also non-agricultural land, including sports pitches and wooded areas which cover some parts of the Site. Such vegetation does absorb carbon dioxide during the daytime, and whist this may have a small positive effect, this is difficult to quantify. Notably, the Site represents a source of net greenhouse gas (GHG) emissions from its agricultural use, which can contribute to increase of GHG emissions in the atmosphere. However, these emissions are not considered to be substantial and are difficult to accurately quantify. For the purposes of the climate change mitigation assessment and to evaluate the 'worst-case' scenario, a baseline of zero emissions has been assumed for the assessment.

Prediction Methodology

12.3.5 This assessment adopts a project lifecycle approach to identify 'hot spots' of GHG emissions, utilising a development's lifecycle stages or 'modules' (A1-A5: construction stage, B1-B7: operational stage, and C1-C4:end of life stage), as defined in BS EN 15978. The use of these modules helps pinpoint emissions sources, associated with different stages of a development's lifecycle , and correspondingly enables priority areas for mitigation to be identified. This approach is consistent with the principles on climate change mitigation set out in the IEMA GHG Guidance 2022.

12.3.6 Key data to calculate emissions include (but are not limited to):

- Construction Phase:
  - Embodied carbon emissions within construction materials;
  - Transportation of construction materials;
  - Number of construction workers predicted and an assumed daily travel commute distance; and
  - Waste produced from enabling works and construction activities.
- Operational Phase:
  - Regulated and unregulated operational emissions;
  - Operational traffic associated with the Proposed Development; and
  - Use, Maintenance, Repair, Replacement, and Refurbishment of materials.
- End of Life Phase:
  - Decommissioning emissions.

12.3.7 The Life-Cycle Modules (A1-A5, B1-B7, and C1-C4) from BS EN 15978 have been assessed as far as practicable, considering the available data, provided by the

Applicant and utilising the One Life Cycle Assessment (LCA)Click Tool[15] to perform calculations, which is considered best practice.

12.3.8 For the evaluation of transport emissions, data from the Transport Assessment (submitted alongside the planning application) have been used; GHG emissions arising from transport during the construction and operation phases have been quantified using Department for Environment, Food and Rural Affairs (DEFRA's) Emissions Factor Toolkit (EFT) v11.0[24] calculator.

Study Boundaries

12.3.9 The geographical scope includes the redline boundary of the Proposed Development (as shown in **Figure 1.1** of **Chapter 1: Introduction**). However, some of the GHG emissions associated with the Proposed Development occur beyond the boundary of the Site (for example, embodied GHG emissions from materials used and GHG emissions from transportation of materials and people associated with the Site). The geographical reach of the impacts are considered later in the assessment.

12.3.10 The impact from GHG emissions is a national and global issue; therefore, the potential impact of the associated GHG emissions of the Proposed Development has been assessed by comparing the GHG emissions against the UK's and Mid Sussex's 4th, 5th and 6th carbon budgets.

Significance Criteria

12.3.11 As stated in the IEMA GHG Guidance 2022, there is no single preferred method to evaluate significance, but the greater the project's carbon budget (i.e. magnitude of change), the greater its significance. Unlike other EIA topics, sensitivity is only considered for a single receptor (i.e. the whole planet), and therefore it is the magnitude that drives significance. It is, consequently, practical to base the assessment on professional judgement, and in a qualitative and comparative manner. This is the reason why the criteria presented in this ES chapter differs from that set out in **Chapter 3: EIA Methodology**. The likely significance of effects, based on a set of significance criteria established in the IEMA GHG Guidance 2022, is summarised in **Table 12.2**.

[24] Defra Emissions Factor Toolkit https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

Table 12.2: GHG Significance Criteria

Significance Rating	Description	Criteria to Determine Significance of Net GHG Emissions
Major Adverse	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.	The project's net 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.
Moderate Adverse	A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.	The project's net 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.
Minor Adverse	A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.	The project's net GHG impacts are: • fully consistent with applicable existing and emerging policy requirements; and • in line good practice design standards for projects of this type.
Negligible	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.	The project's net GHG impacts are: • reduced through measures that go well beyond existing and emerging policy; and • better than good practice design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050.
Beneficial	A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.	The project's net GHG impacts are: • below zero; and • it causes a reduction in atmospheric GHG concentrations, whether directly or indirectly, compared to the without-project baseline.

12.3.12 The IEMA GHG Guidance 2022 also advises that:

- Major or moderate (adverse or beneficial) effects are considered to be significant; and
- Minor adverse and negligible effects are not considered to be significant.

12.3.13 To assess the impact of the emissions from the Proposed Development, the relevant UK Carbon Budget(s) have been used. The UK Carbon Budgets are in place to restrict the amount of GHG emissions the UK can legally emit in a five-year period.

12.3.14 The construction of the Proposed Development is anticipated to run over different timeframes (Phase 1: Q3, 2025 - Q2, 2027; Phase 2: Q3, 2027 - Q2, 2029; Phase 3: Q3, 2029 - Q1, 2032), with construction due to start in Q3 of 2025 and complete by Q1 of 2032, when the Proposed Development will become fully operational.

12.3.15 The appropriate UK Carbon Budget during the construction phase of the Proposed Development is the 4th (2023-2027) and 5th Carbon Budget (2028-2032). The appropriate UK Carbon Budget during the operational phase is the 4th (2023-2027), 5th (2028-2032), and 6th Carbon Budget (2033-2037).

12.3.16 **Table 12.3** shows the current and future UK carbon budgets up to 2037 which highlights a decline in the amount of GHG emissions that the UK can legally emit going into the future. This means that any source of emissions contributing to the UK's carbon inventory is going to have an increased impact on the UK carbon budgets in the future.

Table 12.3: Relevant Carbon Budgets for the Assessment

Carbon budget	Total budget (MtCO2e)
4th (2023-2027)	1,950
5th (2028-2032)	1,725
6th (2033-2037)	965

12.3.17 The Tyndall Carbon Budget Tool[17]presents climate change targets for UK local authority areas including Mid Sussex County that are based on the commitments in the United Nations Paris Agreement[5] informed by the latest science on climate change and defined by science-based carbon budget setting.

12.3.18 **Table 12.4** presents the Mid Sussex District's energy CO2 only budget in the format of the 5-year carbon budget periods in the Act. To align the 2025 to 2100 carbon budget with the UK carbon budget periods in the Act, the Tyndall Centre has included estimated CO2 emissions for 2023 and 2024 based on BEIS provisional national emissions data for 2023 and assuming the same year on year reduction rate applied to 2024.

Table 12.4: Relevant Carbon Budgets for Mid Sussex District

Carbon budget	Total budget (MtCO2e)
4th (2023-2027)	1.4
5th (2028-2032)	0.7
6th (2033-2037)	0.3

Geographic Extent of Effects

12.3.19 The geographic extent of effects arising from the Proposed Development will extend beyond the Site boundary, and could well extend across the entire country, and therefore the extent is considered to be 'global' for GHG and 'local' for climate adaptation / resilience.

Effect Duration

12.3.20 GHG emissions will be generated for the lifetime of the project (or at least up to 2050) by which time it might be expected that net GHG emissions will be zero. They are, therefore considered to be long term. Climate resilience / adaptation effects are also deemed to be long term.

Direct and Indirect

12.3.21 The Proposed Development's GHG emissions will not have any direct environmental effects, but contribute to climate change, which is an indirect environmental effect. The impacts from climate change upon the Proposed Development will have direct effects.

Assumptions

12.3.22 The Proposed Development is anticipated to be complete and operating at full capacity in 2032. However, the traffic flows used in this assessment (provided by the project's Transport Consultant) were based on the Mid Sussex Strategic Highway Model and a future year of 2039 (which is the end of the period for the draft Mid Sussex District Plan), as agreed with West Sussex County Council, to ensure that a worst-case scenario in terms of traffic growth has been considered and assessed.

12.3.23 The estimated number of construction trips to and from the Site during the construction period are presented within **Chapter 5: The Proposed Development and Construction Overview.**

12.3.24 Carbon dioxide equivalent (CO2e) is a term describing greenhouse gases in a common (comparable) unit. For any quantity and type of greenhouse gas, 'CO2e' signifies the amount of CO2 which would have the equivalent global warming impact.

12.3.25 The regulated and unregulated energy CO2 emission values have been taken from the project's Energy and Sustainability Statement, which has been submitted as a standalone report as part of the planning application. The current baseline for GHG emissions has been taken to be zero, representing a conservative worst-case scenario.

Climate Change Adaptation and Resilience

12.3.26 This section considers how the inherent uncertainty of climate change predictions can be managed to allow for appropriate adaptation in the future to reflect the realities of changing climate.

12.3.27 IEMA's Climate Change Resilience and Adaptation (CCRA) Guidance presents a methodology for the consideration of climate change resilience and adaptation in the EIA process, which had been followed for this assessment.

12.3.28 The main steps include:

0) Pre-EIA Stage: How has climate resilience and adaptation been embedded in the design;
1) Scoping Climate Change Adaptation into the EIA;
2) Defining the Future Baseline;
3) Identifying Climate Change Vulnerability;
4) Identifying and Determining Magnitude of Effects;
5) Significance Assessment;
6) Develop Mitigation Measures; and
7) Post-EIA Stage: Monitoring and Adaptive Management.

12.3.29 Consistent with the IEMA CCRA Guidance, a future climate scenario has been developed using future climate projections published by the Met Office (through the UK Climate Projections (UKCP18) website). The results include projections for variables including annual mean temperatures, and annual changes in summer and winter precipitation. UKCP18 has moved away from the use of low, medium, and high emission scenarios and now uses Representative Concentration Pathways (RCPs). These are named according to the concentration of greenhouse gas modelled to occur in the atmosphere in 2100.

12.3.30 The IEMA CCRA Guidance[2]introduced a new significance aspect which should be considered in a climate change assessment. Determination of the risk level of climate hazards and thus significance of effect is based on a combination of likelihood and consequence. The assessment is qualitative and uses expert judgement based on knowledge of similar schemes, engagement with the wider project team and a review of relevant literature.

12.3.31 **Table 12.5** shows the significance matrix applied within this assessment. The assessment differs to that shown in **Chapter 3: EIA Methodology**, due to the fact that there are no impact descriptors for magnitude of effect for this topic; the assessment, therefore, follows the established IEMA CCRA Guidance to establish effects.

Table 12.5: Significance of Effects Matrix

Likelihood of Climate Change Impact	Consequence of Climate Change Impact				
	Negligible	Minor Adverse	Moderate Adverse	Large Adverse	Very Large Adverse
Very High	Not Significant	Significant	Significant	Significant	Significant
High	Not Significant	Not Significant	Significant	Significant	Significant
Medium	Not Significant	Not Significant	Not Significant	Significant	Significant
Low	Not Significant	Not Significant	Not Significant	Significant	Significant
Very Low	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant

12.3.32 The 'In-Combination Climate Impacts' (ICCI) assessment identifies whether the additional effects of future climate impacts alter the sensitivity and / or magnitude of the effects identified within other topic chapters as part of the ES. The aim of the assessment has been to consider whether the residual effect on receptors (under the current condition, without climate change) are likely to be different under the future baseline. The assessment, in particular, identifies whether the potential impacts and residual effects of the Proposed Development will be worse or improve under the future baseline, and therefore if these changes alter the significance of effects identified for the Proposed Development under the current condition (without climate change). A key aspect of the assessment (for each of the technical topics considered) has been to identify the likely effect to those receptors considered more vulnerable to changes in climate, having taken into account the resilience and adaptive measures (being either design or management) which are considered for the Proposed Development in order to mitigate the risk presented by climate change. This assessment is based on the professional judgment of each technical chapter lead.

12.3.33 It should be noted that climate resilience of the Proposed Development to climate change has been taken into consideration in the design process, by discussions held between the design team technical topics, architects and engineers over the course of design team meetings and workshops.

Limitations and Assumptions

12.3.34 There are a number of limitations associated with the assessment of climate change adaptation and risks from more extreme weather. Climate projections have been used from United Kingdom Climate Projections (UKCP18), under an appropriate

scenario and timescale, although within that there will be fluctuations given the inherent uncertainties within the modelling underpinning this assessment. This is the best data available and considered to be best practice.

12.3.35 Furthermore, given the long-term nature of the assessment, a broader consideration of receptor types (rather than specific receptors identified in other parts of the ES) have been used, upon which to base consideration of how projected climatic conditions could affect these. This is due to the fact that much can change within a site between now and 2100 and this covers any unknowns. There is also no specific requirement to produce a Climate Change Adaptation Plan, or stipulation to monitor the resilience of the Proposed Development to the changing conditions across its lifespan.

12.4 Scoping and Consultation

12.4.1 No EIA scoping or consultation has been undertaken; however, professional judgment has been used to ensure that an appropriate assessment has been undertaken.

12.5 Baseline Assessment and Identification of Key Receptors

Climate Change Mitigation (GHG Emissions)

12.5.1 In order to understand trends in GHG emissions within the Mid Sussex District, a review of emissions from common sources (transport, domestic and industrial / commercial) over the last 20 years has been carried out. Data has been taken from the UK Local Authority and regional carbon dioxide emissions national statistics[25]. **Table 12.6** below shows per capita carbon dioxide emission within the Mid Sussex District between 2005 and 2019 and is showing a decreasing trend over time (the latest data available on the website).

Table 12.6: GHG emissions within Mid Sussex District

Year	Industry and Commercial Total	Domestic Total	Transport Total	Grand Total	Population ('000s, mid-year estimate)	Per Capita Emissions (t)
2005	224.5	343.8	341.9	885.6	130.5	6.8
2006	227.8	348.0	336.5	884.3	132.1	6.7
2007	226.0	338.5	333.4	869.7	134.0	6.5

[25] UK Local Authority and regional carbon dioxide emissions national statistics: 2005 to 2019

Year	Industry and Commercial Total	Domestic Total	Transport Total	Grand Total	Population ('000s, mid-year estimate)	Per Capita Emissions (t)
2008	214.8	340.2	314.8	839.7	135.7	6.2
2009	203.5	308.4	308.0	787.4	137.2	5.7
2010	220.1	332.4	301.7	822.6	138.9	5.9
2011	202.8	289.2	291.2	746.2	140.2	5.3
2012	215.1	312.5	282.2	776.1	141.3	5.5
2013	208.2	306.4	275.5	755.0	143.0	5.3
2014	186.6	261.8	277.9	685.4	144.7	4.7
2015	171.4	257.6	289.5	676.9	146.0	4.6
2016	151.9	242.4	302.1	652.0	147.5	4.4
2017	144.2	227.1	302.1	624.0	148.3	4.2
2018	143.2	230.2	301.3	623.9	149.7	4.2
2019	136.9	224.7	288.9	598.6	151.0	4.0

12.5.2 When considering carbon dioxide emissions reductions alongside population growth, it can be concluded that there is a pattern of per capita emissions reduction and, therefore, it is expected that this trend will continue, and at a much higher rate, given the target of the UK to meet Net Zero by 2050.

Existing Baseline

12.5.3 The baseline conditions at the Site prior to the construction of the Proposed Development are described in **Chapter 2: The Site.**

12.5.4 Baseline GHG emissions are considered to be zero for the purposes of this assessment, as there are no existing buildings on-site. Therefore, a zero emissions baseline has been assumed as a worst-case scenario.

Future Baseline (the 'do nothing' scenario)

12.5.5 Considering known trends and policy support for reducing GHG emissions, it is considered that in the case of a 'do-minimum' scenario, there would be reductions in emissions over the next 20 years resulting from aspects such as electric vehicles replacing petrol / diesel, smart technology helping to reduce demand, and decarbonising the National Grid.

12.5.6 Due to the ongoing decarbonisation of the grid, it can be expected that the future baseline would gradually decline in line with future carbon budgets and declining sectorial emissions presented in **Table 12.6** above.

Receptors

12.5.7 The receptor for the climate change mitigation assessment is the global atmosphere, which is always of high sensitivity.

Climate Change Adaptation and Resilience

Existing Baseline

12.5.8 Over the past few decades, the South-East of England has experienced a gradual increase in average temperatures, with a trend towards milder winters and hotter summers. Rainfall patterns have shown some variability, with more frequent heavy rain events in recent years.

12.5.9 Presently, the region faces occasional flooding during intense rainfall events, particularly in urban areas. Additionally, periods of water scarcity have been observed during extended dry spells[26].

Future Baseline

12.5.10 This corresponds with the following stage of the IEMA CCRA Guidance[2]:

- Defining the Future Baseline.

12.5.11 UKCP18[27] was reviewed in order to establish an appropriate future baseline. Due to inherent uncertainty in future climate, and the vast data sets underpinning the modelling, the 'UKCP18 Factsheet: Derived Projections[28] was used as it provided an accessible and clear summary.

12.5.12 Using a future assessment timeframe of 2081-2100 (representing a period when the Proposed Development is expected to still be in operation), over land, the projected general trends of climate changes are expected to move towards warmer, wetter winters and hotter, drier summers. However, natural variations mean that some cold winters, some dry winters, some cool summers and some wet summers will still occur. All figures below are relative to present day (1991-2020) and as the Proposed Development is located in the Mid Sussex District, it is appropriate to consider the south-east of England as the appropriate geographical location.

[26] https://www.metoffice.gov.uk/weather/climate/uk-climate

[27] https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-derived-projections.pdf

12.5.13 There are 4 Representative Concentration Pathways RCPs, or scenarios of possible climate future, available in the UKCP18 climate projections: 2.6, 4.5, 6.0 and 8.5, and RCP 8.5. The RCP 8.5 has been used within this assessment, as it is the most conservative, highest-impact scenario.

12.5.14 The choice of RCP and time period for which climate projections are selected is an important step in defining the future climate baseline. As per the UKCP18 derived projects, the below future baseline has been assessed.

12.5.15 At 2°C of global mean warming (RCP8.5, 10th percentile):

- For temperature:
  - The largest warming in the UK will be in the south-east where summer temperatures may increase another 3 to 4°C;
  - Median warming will be at least 1 to 2°C throughout the year across the whole of the UK;
  - Winter cool days will warm by 1 to 1.5°C across the country, whilst temperatures on warmer winter days increase by less than 1°C; and
  - In summer, both hot and cool days will warm by 1.5 to 2°C across England.
- For precipitation:
  - Changes are uncertain, but suggest slightly wetter winters and drier summers, with summer drying more in the South.

12.5.16 At 4°C of global warming (RCP 8.5, 90th percentile), changes compared to present day have a similar spatial pattern to those at 2°C but larger:

- For temperature:
  - All seasons warm, but summers warmer than winters;
  - Summer temperatures will rise by another 4 to 5°C in the south-east of England and 3 to 4°C elsewhere in the country.
  - Hot summer days will warm by 4.5 to 5°C compared to present day, across much of south-east England, possibly exceeding 5°C in some locations:
  - Cooler summer days will warm by 4 to 4.5°C across England and up to 5°C in the south-east;
  - Cool winter days will warm by 2.5 to 3°C across the country; and
  - Warm winter days will warm by 2.5 to 3°C in England.
- For precipitation:
  - Median winter precipitation will increase by up to 20% across most of the country;

- Median summer precipitation will decrease most in the south, with median reductions of up to 20 to 30% across much of the England;
- Dry summer days will decrease in precipitation by up to 50% in summer across much of south-east England.

Receptors

12.5.17 Receptors will include the Proposed Development itself and all other receptors as outlined in other technical chapters of the ES.

12.6 Identification and Description of Changes Likely to Generate Effect

Climate Change Mitigation (GHG Emissions)

12.6.1 The assessment has taken a whole-life approach to develop a GHG footprint for the Proposed Development.

Construction Phase

12.6.2 Activities undertaken in this phase correspond to the material sourcing and construction of the Proposed Development. Under this category, changes likely to generate effects are carbon emissions from the sourcing, transportation, fabrication and construction of all materials and products.

12.6.3 The construction works have the potential to generate GHG emissions through the running of plant, the transportation of waste and materials from the Site and through embodied carbon within the fabric of building materials.

Operational Phase

12.6.4 During the operational life of the Proposed Development there is a large potential for GHG emissions to arise from:

- Energy use associated with uses regulated under Part L of the Building Regulations 2021 (with 2023 amendments) (i.e. lighting, hot water, pumps / fans, space heating, cooling);
- Energy use associated with direct unregulated usage that is not covered by the Building Regulations (i.e. electrical appliance use and communal lighting); and
- Indirect emissions through the use of different transport modes to and from the Proposed Development.

End of Life Phase

12.6.5 End-of-life emissions can pose a significant source of emissions by virtue of the demolition, transport, waste processing and disposal of materials.

Climate Change Adaptation and Resilience

12.6.6 Overall warmer, wetter / drier climatic conditions combined with more extreme weather events can lead to a number of effects such as:

- Increased number of extremely hot days (medium likelihood);
- Extremely cold weather (medium likelihood);
- Increased frequency of flooding from river, surface and ground sources (medium likelihood);
- Increased risk of drought (medium likelihood);
- Extreme wind speeds (low likelihood); and
- Increased risk of lightning strikes (low likelihood).

12.6.7 These can be considered in terms of the risk they pose to the Proposed Development and its occupiers directly, or they can have an in-combination effect with other impacts anticipated as part of the ES.

12.7 Assessment of Likely Significant Effect

Climate Change Mitigation (GHG Emissions)

Construction Phase

Construction Materials

12.7.1 The embodied carbon associated with the building materials for the Proposed Development was quantified (as set out in **ES Volume 4, Appendix H**) using estimated quantities of all materials (e.g. concrete), and applying this information to the One Click LCA tool. A worst-case scenario has been applied, with material selection not taking account of likely decreases in caron content of say, granulated slag concrete for example.

Embedded Mitigation Measures

12.7.2 Proposals for the project waste, environmental control and monitoring will be detailed within the Construction Environmental Management Plan (CEMP), that will be set as a suitable worded planning condition to any planning permission.

12.7.3 The aim is to minimise waste production at source during the design stage. This involves providing recycling and composting facilities and promoting sustainable practices. Both internal and external storage areas will be designed in alignment with local recycling and organic waste collection services. A Site Waste Management Plan (SWMP) will be implemented for the construction phase which will aim to reduce waste generation and target a diversion rate from landfill of up to 95% for non-hazardous construction waste. Furthermore, the aim for a space heat demand has

been established to be between 15-25kWh/year/sqm, for the Proposed Development., meaning less carbon is required to heat the building. Achieving these goals is closely tied to reducing embodied carbon emissions, with a target of less than 500 kg CO2e/sqm for residential buildings. Efforts will also focus on minimising the impact of existing material transportation methods by supporting the use of vehicles with the new, cleaner technologies.

Anticipated Effects

12.7.4 The total embodied carbon in the building's materials (taken from Modules A1-A3 of the One Click LCA tool) is approximately 30,954 tonnes of carbon dioxide equivalent (TCO_2e).

12.7.5 Assuming an even distribution of emissions across the construction programme, there would be 11,607 TCO_2e contribution to the 4th Carbon Budget and 19,346 TCO_2e contribution to the 5th Carbon Budget. This would equate as follows:

- 4th Carbon Budget – 0.0006 % of the UK's budget, 0.82 % of the MSDC's budget; and
- 5th Carbon Budget – 0.001% of the UK's budget, 1.6 % of MSDC's budget.

12.7.6 Given that the total design life of the Proposed Development is expected to be at least 60 years, the effect is considered to be **minor adverse**, and **not significant** in the context of UK statutory and local Carbon Budgets.

Construction Traffic

Embedded Mitigation Measures

12.7.7 Embedded mitigation measures for the construction phase of the Proposed Development broadly focus on the mitigation measures within the CEMP, which is anticipated to be conditioned as part of the planning permission for the Proposed Development. Appropriate measures to ensure that highways do not become affected by deliveries to Site will be set out in the CEMP.

Anticipated Effects

12.7.8 The total carbon emissions associated with transporting the materials to and from the Site was calculated by using the latest version of the Defra Emissions Factor Toolkit23 (v. 11.0). This toolkit utilises the total number of vehicle movements, with assumptions being made with respect to size and assuming a standard fuel type. It has also been assumed a 16 km total round trip for deliveries of construction materials, as a worst-case assessment. The calculations are provided in **ES Volume 4, Appendix H**.

12.7.9 Overall, 54.8 TCO_2e will be produced per annum during the construction period which equates to 438.4 TCO_2e in total. This would equate to 1,315 TCO_2e contribution

to the 4th Carbon Budget and 2,192 TCO_2e contribution to the 5th Carbon Budget. This equates to the following:

- 4th Carbon Budget – 0.000067 % of the UK's budget, 0.093 % of the MSDC's budget; and
- 5th Carbon Budget – 0.0001% of the UK's budget, 0.31 % of the MSDC's budget.

12.7.10 Given that the total design life of the Proposed Development is expected to be at least 60 years, the effect is considered to be minor adverse, and not significant in the context of UK statutory and local Carbon Budgets.

Construction Plant

Embedded Mitigation Measures

12.7.11 Construction plant anticipated to be used during construction of the Proposed Development are outlined in the **Chapter 5: The Proposed Development and Construction.** The CEMP will outline measures to ensure the use of plant on-site is as carbon efficient as possible.

Anticipated Effects

12.7.12 Site enabling, excavation and construction activities require a substantial amount of fuel / energy to run the machinery and plant. The activities are expected to include excavation and pilling substructure, superstructure construction and internal fit out. The plant used is likely to include excavators, concrete pump, generators, etc. In addition, there is also other direct energy usage through Site offices and welfare facilities, lighting, security equipment etc., all of which use energy.

12.7.13 The One Click LCA tool was used to calculate the carbon emissions arising from Module A5, including Site operations (construction plant) for the Proposed Development. The CO_2 emissions anticipated are 1,493 TCO2e. Assuming an even distribution of emissions across the construction programme (as a worst-case assessment, given the availability of information), there would be 560 TCO2e and 933 TCO2e emitted in the 4th and 5th Carbon Budgets, respectively. This would equate as follows:

- 4th Carbon Budget – 0.00003 % of the UK's budget, 0.04 % of the MSDC's budget; and
- 5th Carbon Budget – 0.00006 % of the UK's budget, 0.13 % of the MSDC's budget.

12.7.14 Given that the total design life of the Proposed Development is expected to be at least 60 years, the effect is considered to be **minor adverse**, and **not significant** in the context of UK statutory and local carbon budgets.

Construction Phase Emission Summary

12.7.15 The total CO_2 emissions during the construction phase including the embodied carbon of materials, construction traffic and plant as described above and its comparison with 4th and 5th national UK Carbon Budget is presented in the **Table 12.7.**

12.7.16 The One Click LCA tool and the Defra EFT Toolkit was used to calculate the carbon emissions during the construction phase of the Proposed Development. The total embodied carbon value represents emissions from Module A1-A5 of the life cycle assessment process.

12.7.17 The total TCO_2e emissions from the construction phase are 32,885 TCO_2e.

12.7.18 This is considered to be 12,331 TCO2e and 24,303 TCO2e effect at a UK statutory level (equating to 0.00063 % and 0.0012 % of the 4th and 5th UK Carbon Budgets respectively). This equates to 0.88% and 0.3% of the MSDC 4th and 5th Carbon Budgets respectively.

12.7.19 **Table 12.7** below shows the embodied carbon, construction traffic and plant emissions of the Proposed Development, which together are Not Significant.

Table 12.7: CO_2 emissions during the construction phase and comparisons to carbon budgets

Construction Impact	CO_2 emissions (TCO_2e)	% of 4th National Carbon Budget	% of 5th National Carbon Budget
Embodied Carbon (Module A1-A3)	30,954	0.0006	0.001
Construction Traffic	438.4	0.00006	0.00003
Construction Plant (A5)	1,493	0.00001	0.00007
Total	**32,885**	**0.00067**	**0.0011**

Operational Phase

Operational Energy Use (B6-B7)

Embedded Mitigation Measures

12.7.20 Mitigation measures are outlined in the Energy and Sustainability Statement (which has been submitted as part of the planning application), which is considered best practice, with the aim of promoting an energy efficient and low carbon approach which minimises carbon usage now and in the future. The energy hierarchy aims to: 1) Be Lean: use less energy; 2) Be Clean: supply energy efficiently; and 3) Be Green: use renewable energy.

12.7.21 Through a combination of energy efficient thermal properties, LED lighting, mechanical ventilation with heat recovery (MVHR), air source and ground source heat

pumps, and solar photovoltaic (PV) panels and hot water panels, the Energy and Sustainability Statement confirms that a minimum 60% reduction in carbon emissions over Part L of the Building Regulations 2021will be achieved.

Anticipated Effects

12.7.22 In accordance with the Mid Sussex Sustainable Economy Strategy[28], the Energy and Sustainability Statement confirms that the Proposed Development will aim to mitigate the effects of climate change by reducing at least 60% of carbon emissions over Part L of Building Regulations 2021 (amended 2023). The review of individual blocks indicate that the dwellings' emissions rate will be reduced by 76%, due to a reduction in fuel related emissions, as this is below the Part L Building Regulations 2021 (amended 2023), which exceeds the policy target and is therefore compliant.

12.7.23 As set out in the Energy and Sustainability Statement submitted as part of the planning application, measures being adopted for the Proposed Development will lead to operational energy use emissions of 23,350 TCO2e per annum.

12.7.24 The Proposed Development has been designed to include energy-efficient measures and adheres to the low-carbon standards, in alignment with MSDC's planning policies. As a result, the effect is deemed to be **minor adverse** and **not significant.**

Unregulated Emissions

Embedded Mitigation Measures

12.7.25 The Applicant proposes to adopt steps to reduce energy consumption from unregulated sources. These steps include implementing high-efficiency vertical transportation systems (e.g. energy-efficiency lighting) and procuring appliances with a 'B' or 'C' rating, as per the Energy and Sustainability Statement submitted as part of the planning application.

Anticipated Effects

12.7.26 Unregulated energy usage encompasses small power electricity consumption, including small power devices, cooking and other appliances and external lighting. Measures adopted for the Proposed Development are expected to lead to unregulated energy use of 21,732 TCO2e per annum, as per the Energy and Sustainability Statement, submitted as part of the planning application, which follows a worst-case assessment approach.

[28] https://www.midsussex.gov.uk/business-licensing/sustainable-economy-strategy-and-action-plan-2022-2025/

12.7.27 Measures adopted have been designed to save energy and the Proposed Development adheres to low carbon standards, in alignment with MSDC's planning policies. As a result, the effect is deemed to be **minor adverse** and **not significant.**

Operational Repair and Refurbishment (B1-B5)

Embedded Mitigation Measures

12.7.28 The operational repair and refurbishment of the Proposed Development would release a potentially large magnitude of emissions. The emissions from repair and refurbishment (Modules B2-B5) refer to the replacement / refurbishment of building parts during the use stage. RICS guidance[29] provides assumptions on building materials / component lifespans which have been used for this assessment, which is considered to be best practice.

12.7.29 RICS guidance estimates that for residential development, embedded GHG emissions during use (i.e. repair, maintenance and refurbishment) account for approximately 35% of the embedded GHG emissions to practical completion. Given that the Proposed Development is predominately residential-led, the repair and refurbishment emissions assessment of the Proposed Development is based on 35% of the embodied carbon emissions presented in **Table 12.7.**

Anticipated Effects

12.7.30 In total, emissions arising from the repair and refurbishment of the Proposed Development throughout its lifespan will amount to approximately 10,833 TCO2e. This is equivalent to an annual emission rate of 180.5 TCO2e, and 902.5 TCO2e emitted in the 5th and 6th Carbon Budget, respectively. This would equate as follows:

- 5th Carbon Budget – 0.00001% of the UK's budget, 0.02% of the MSDC's budget; and
- 6th Carbon Budget – 0.00009% of the UK's budget, 0.3% of the MSDC's budget.

12.7.31 These would be considered a **minor adverse** and **not significant** effect at the local and higher UK national spatial levels.

Operational Traffic

Embedded Mitigation Measures

12.7.32 An Energy and Sustainability Statement has been prepared to consider accessibility of the Site using different modes of transport, with particular emphasis on zero

[29] https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards

emission vehicles and bicycles to encourage a more sustainable and greener environment, where applicable.

12.7.33 Measures are proposed to enhance sustainable access by including active electrical vehicle charging points for all dwellings and in the other car parks for Flats and Non-Domestic / Community Use. Additionally, appropriate (policy complaint) levels of cycles storage and parking will be provided. Bus stop infrastructure is to serve diverted or expanded bus services, increasing the accessibility to public transport across the local area.

Anticipated Effects

12.7.34 The breakdown of trips generated by the Proposed Development, including the different modes of travel have been provided by the project's Transport Consultant. The data provides a breakdown of heavy good vehicles (HGVs) and light goods vehicles (LGVs) projected splits at the operational year 2032 of the Proposed Development, which was used to supplement the Defra EFT calculations.

12.7.35 The full EFT calculation table for operational traffic generated is presented in **ES Volume 4, Appendix H.**

12.7.36 In total, the operational emissions arising from transport in the operational year 2032 of the Proposed Development equates to 2,125.54 TCO_2e. Assuming it will be the same across all 60 years of operation, this would contribute to 2,125.54 TCO_2e, and 10,627.7 TCO_2e for the 5th and 6th Carbon Budgets respectively.

12.7.37 The above noted emissions would represent the following:

- 5th Carbon Budget – 0.0001 % of the UK's budget, and 0.3 % of the MSDC's budget; and
- 6th Carbon Budget – 0.001% of the UK's budget, and 3.5 % of the MSDC's budget.

12.7.38 These would be considered a **minor adverse** and **not significant** effect in relation to the UK statutory budget, and **minor adverse** and **not significant** in relation to the local budget.

Operational Phase Emissions Summary

12.7.39 The total CO_2 emissions during the operational phase including operational energy, maintenance and material replacement and traffic, as described in the above sections, and its comparison with the 5th and 6th national Carbon Budget is presented in the **Table 12.8.**

12.7.40 The Energy and Sustainability Statement and the Defra EFT toolkit were used to calculate the carbon emissions during the operational phase at the Proposed Development. The CO_2 emissions anticipated are 2,843,285 TCO2e.

12.7.41 This is considered to be a **minor adverse** and **not significant** (equating to 0.0027% and 0.025 % of the 5th and 6th national Carbon Budgets, respectively).

12.7.42 However, the real-life percentage is assumed to be lower, as further decarbonisation will occur towards the later Carbon Budgets, and likely new policy uptake due to UK national net zero target.

Table 12.8: CO2 emissions during the operational phase and comparisons to carbon budgets

Operational Impact	CO_2 emissions (TCO_2e)	% of 5th National Carbon Budget	% 6th National Carbon Budget
Operational energy (B6)	2,704,920	0.001	0.001
Operational traffic	127,532	0.0001	0.001
Maintenance and Material Replacement (B2-B5)	10, 833	0.00001	0.00009
Totals	**2,843,285**	**0.0027**	**0.025**

End of Life Phase

Embedded Mitigation Measures

12.7.43 The building design will align with the BS 8001:2017 framework for implementing circular economy principles. It will include features for potential deconstruction and easy disassembly, facilitating material recovery at the end of the building's life cycle.

12.7.44 Moreover, at a point in the future there are likely to be very different circumstances when the Proposed Development reaches its end of life, such as the availability of building materials, meaning there should be more demand.

Anticipated Effects

12.7.45 Once the Proposed Development reaches the end of its design life, it is anticipated that it will be replaced by new buildings or uses. Any trees planted are expected to be fully mature / veteran and be sequestering carbon effectively by that time.

12.7.46 The emissions associated with One Click LCA tool Module C1-C4 (End of Life) are estimated at 839 TCO2e, which is considered to be **minor adverse** and **not significant**.

Climate Change Adaptation and Resilience

In-Combination Climate Change Assessment

12.7.47 **Table 12.9** considers the receptors associated with the other topics scoped into the ES, and, using professional judgement, identifies any risks to these receptors or

sensitivity to climate change. Given the long-term nature of the changes, a more generic receptor description is provided.

12.7.48 In considering ICCI, the assessment has not considered the construction phase of the Proposed Development. This is due to the construction phase being short term (2025-2032); therefore, the significant impacts of intensifying climate change would be unlikely to fully manifest in this timeframe. Therefore, **Table 12.9** and the consideration of ICCI focuses on the operational phase of the Proposed Development.

Table 12.9: ICCI Assessment

ES Chapter	Sensitive Receptor	Potential effect of climate change	Relative Likelihood
Socio-economics	Existing and future residents and businesses	Heatwaves and higher temperatures could result in Site residents and personnel welfare impacts for example, heat stress and unsafe working conditions (at school, commercial units and care home).	Medium
Traffic and Transport	Pedestrians and cyclists	Active transport users will be more susceptible to extreme weather e.g. heavy rainfall or extreme heat.	Medium
	Public Transport users	Public transport users may experience discomfort in extreme weather e.g. heatwaves.	
Air Quality	Future Site users	High temperatures could lead to increased dust generation on-site, along with windows being left open.	Medium
Noise and Vibration	Existing and future residential receptors	Hotter temperatures may result in windows being left open for longer. Cooling / ventilation plant may be required to run for longer.	Medium
Agriculture and Soil	Agricultural businesses	Droughts and water shortages can lead to reduced crop yields and increased competition for water resources. Frequency and severity of extreme weather events like floods and wildfires can damage crops, infrastructure, and equipment, leading to financial losses for agricultural businesses.	Low
Ecology	Landscaping	Increased frequency and severity of extreme heat events (i.e. heat waves) could result in the soft landscape design (trees and shrubs) being	Medium

ES Chapter	Sensitive Receptor	Potential effect of climate change	Relative Likelihood
		compromised (e.g. desiccation of wetlands, and stresses on the associated fauna). Extreme rainfall events & heat events could comprise ecological assets around the Site.	
Landscape and Visual Impact Assessment	Hedgerows and veteran Category A oak trees	Increased frequency and severity of extreme heat events could result in the trees and hedgerows being compromised (e.g. tree failure).	Medium

12.7.49 As shown in **Table 12.9**, there is a potential for climate change to affect some, but not all, topics in this ES. Operational climate resilience and adaptation effects will range from low to medium likelihood, with the consequence for each effect being **minor adverse**. The consequence is derived from the IEMA definition of minor adverse: *'It is expected that there will be only localised disruption or loss of service. No permanent damage, minor restoration work required: disruption lasting less than one day. Small financial losses and/or slight adverse health or environmental effects'.*

12.7.50 In-combination climate change effects are therefore anticipated to be **not significant**.

12.7.51 Embedded climate resilience mitigation has been provided in the Proposed Development, including the following:

- Overheating Strategy: Compliant with Part O of the Building Regulations, ensuring comfortable thermal conditions for occupants will be undertaken at reserved matters.
- Flood Risk Assessment and Drainage Strategy: Designed to control on-site and off-site flooding through sustainable drainage solutions.
- Landscaping Strategy: Incorporates wildlife-friendly plantings and amenity space landscaping to enhance biodiversity and provide shading.
- Further measures could include a ventilation strategy to avoid overheating concerns, and a water efficiency strategy to incorporate measures to minimise water use within the Proposed Development.

12.7.52 A set of further measures that can inform a Climate Change Adaptation Plan is provided under the 'Scope for Additional Mitigation Measures' section, to demonstrate how these effects could be mitigated in the future and significant effects avoided.

12.8 Scope for Additional Mitigation Measures

Potential Additional Mitigation Measures

Climate Change Mitigation (GHG Emissions)

Construction Phase

12.8.1 Off-site manufacture of pre-fabricated components should be considered through a smart procurement strategy.

12.8.2 There are reasonable opportunities to implement additional mitigation measures by reviewing the materials prior to construction to identify opportunities for replacing a material with one with a lower embodied carbon (for instance sourcing only recycled metals and using cement with a higher fly ash content), or less material overall (such as thinner slabs, frames and piles).

12.8.3 A Climate Change Adaption Plan could be produced (at a future design stage) as a measure to mitigate against the effects of climate change on generic receptors as described above. This could include, but not be limited to, the following measures:

- Water consumption in the Proposed Development could be minimised by the specification of even more highly efficient water installations in the future. Further consideration of rainwater / greywater harvesting could also be given, including the future adaptability to collect this in greater quantities.
- External spaces could be planted with a range of species, including native and drought resistant species. Tree sizes and pits should be appropriately sized to deal with periods of drought in summers.

12.8.4 However, care must be taken to:

- Consider the need to adapt to climate change:
- Balance this with the opportunities to minimise carbon emissions associated with the operation; and
- Consider the circular economy, with respect to safeguarding opportunities for the reuse or better recycling of a building material or component.

12.8.5 Monitoring tools can be used to record and monitor the CO_2 emissions from the transportation of construction materials which should be considered at a later design stage.

12.8.6 Furthermore, as part of the asset management procedures, when certain building components reach the end of their useful life, consideration should be given to the embodied carbon content of any replacement components.

Operational Phase

12.8.7 The following could be considered when appointing off-site suppliers; minimising of the number of vehicle movements; and promoting collaboration with other suppliers to minimise deliveries, type of delivery vehicles used and efficient Site off-loading. A Travel Plan and Travel Pack will be provided for residents.

End of Life Phase Emission

12.8.8 The key element that has been considered at this stage to reduce emissions is the incorporation of 'circular economy' principles:

- Conserve resources and source ethically;
- Design to eliminate waste (and for ease of maintenance); and
- Manage waste sustainably and at the highest value.

Climate Adaptation and Resilience

12.8.9 The inherent uncertainty of climate change predictions can be managed, to allow for appropriate adaption in the future to reflect the realities of changing climate. The IEMA CCRA Guidance recommends that a project's ability to adapt to climate change should:

- Consider the whole lifetime of the project (from design stage through to decommissioning);
- Have a 'win-win' outcome that can provide benefits under multiple scenarios, and that can bring economic, social and environmental benefits;
- Favour flexible future options (including building appropriate safety margins), rather than being too prescriptive;
- Delay details of project elements that are subject to the greatest risk and uncertainty from climate change until later in the programme when more should be known; and
- Follow a hierarchy, whereby avoid, control or manage risk is preferred, enhancement (e.g. to improve the functionality over a project's lifespan), and compensate (e.g. by providing a measure to offset a climate change impact it exacerbates).

Likely Effectiveness of Additional Mitigation Measures

Climate Change Mitigation (GHG Emissions) and Adaptation

12.8.10 Although it is not possible to quantify the effectiveness of this mitigation at this stage, there will be opportunities to reduce the embodied carbon, and these could be considered at an appropriate design stage.

12.8.11 The additional mitigation measures have the potential to substantially reduce GHG emissions associated with embodied materials, construction and operation. The additional mitigation measures have the potential to reduce the impacts oF the Proposed Development itself and other receptors from the impacts of climate change.

12.9 Residual Effects

12.9.1 There are no significant residual effects anticipated to arise during construction or operation of the Proposed Development in regard to climate change mitigation or adaptation.

12.10 Cumulative Effects

12.10.1 As set out in the IEMA GHG Guidance, *"GHG emissions from all projects will contribute to climate change; the largest interrelated cumulative environmental effect"*. This statement relates to 'cumulative' on a global scale as all emissions of GHG's contribute to climate change. The definition of 'cumulative effects' in the context of greenhouse gases and climate change therefore goes far beyond the typical definition of cumulative effects for EIA, which tends to focus on other proposed projects in the vicinity of the Proposed Development.

12.10.2 The EIA has identified 6 cumulative schemes for consideration in the assessment. It is difficult to quantify the greenhouse gas emissions from each of the 6 cumulative schemes and as discussed above cumulative contributions to climate change from GHGs will extend well beyond these schemes. It is expected that mitigation will be provided, principally for operational energy and transport, which are policy compliant and work to minimise the on-site GHG emissions and reduce the lifetime GHG emissions of each cumulative scheme. For the GHG assessment, all emissions are inherently cumulative, and there should be no reason for examining the closest 6 schemes over any other, nor any judgement on significance made.

12.10.3 No assessment, therefore, has been carried out on any of the cumulative schemes.

12.11 Summary and Conclusions

12.11.1 This chapter has considered both how the Proposed Development can mitigate its effect on climate change by reducing GHG emissions throughout its lifecycle, and how it can be affected by (and adapt to) a changing climate over time.

Climate Change Mitigation (GHG Emissions)

12.11.2 Net emissions from the existing Site are considered to be negligible, so for the purposes of this assessment, a zero emissions baseline has been adopted.

12.11.3 A life cycle assessment methodology approach has been undertaken for this GHG assessment. This includes assessing emissions from construction materials, construction and operational transportation, operational energy, and operational repair /refurbishment.

12.11.4 A range of embedded mitigation measures have been incorporated in the Proposed Development to minimise GHG emissions, appropriate to the scale and opportunities associated with the Proposed Development. These include accessible access to Site for sustainable modes of transport, and appropriate level of cycle and car parking.

12.11.5 The residual effects, following the incorporation of mitigation measures, are considered to be **minor adverse (not significant)** against UK and local Carbon Budgets during the construction phase.

12.11.6 The residual effects following incorporation of mitigation measures are **minor adverse (not significant)** during the operation of the Proposed Development.

12.11.7 Additional mitigation measures could include a Site Waste Management Plan, and monitoring tools to record and monitor the CO_2 emissions from transport.

Climate Change Adaptation and Resilience

12.11.8 The existing baseline is weather patterns in the south-east of England over the past 20 years. Using a future assessment timeframe of 2081-2100 (representing a period when the Proposed Development is expected to still be in operation), over land, the projected general trends of climate changes are expected to move towards warmer, wetter winters and hotter, drier summers. However, natural variations mean that some cold winters, some dry winters, some cool summers and some wet summers will still occur.

12.11.9 Determination of the risk level of climate hazards and thus significance of effect is based on a combination of likelihood and consequence. The assessment is qualitative and uses expert judgement based on knowledge of similar schemes, engagement with the wider project team and a review of relevant literature.

12.11.10 Embedded mitigation includes drainage, ventilation, water efficiency, landscaping, daylight and overheating strategy.

12.11.11 There is a potential for climate change to affect some, but not all topics in this ES. Operational climate resilience and adaptation effects will range from low to medium likelihood, with the consequence of each effect being **minor adverse**.

12.11.12 A Climate Change Adaptation Plan could be produced (at a future detailed design stage) as a measure to mitigate against the effects of climate change on generic receptors as described within this ES chapter.

12.11.13 There will be **no significant** climate change resilience and adaptation effects.

12.11.14 **Table 12.10** summarises the climate change mitigation and adaptation effects resulting from the Proposed Development.

Table 12.10: Summary of Residual Effects

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
Construction								
Global Climate	High	Building materials Construction waste Construction traffic emissions Construction plant emissions	Construction Environmental Management Plan (CEMP) Site Waste Management Plan (SWMP)	High Direct Local and Global Short and Long Term Likely	Minor Adverse	Consider using lower embedded carbon materials Fuel efficient vehicles Locally sourced products (circular economy)	Minor Adverse	Not Significant
Operation								
Global climate	High	Regulated / Unregulated energy use Operational transport	Energy and Sustainability statement	High Direct Local and Global Short and Long Term	Minor Adverse	De-carbonisation of grid electricity	Minor Adverse	Not Significant

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
		emissions Other emissions (Repair and Refurbishment)		Likely				
Proposed Development	Medium	Future climate change and its impact	Overheating Strategy, Flood Risk Assessment and Landscape Design	High Direct Local Long Term	Minor Adverse	Follow a hierarchy, whereby avoid, control or manage risk is preferred, or enhancement	Minor Adverse	Not Significant