Chapter 14

CLIMATE CHANGE AND GREENHOUSE GASES

14 Climate Change and Greenhouse Gases

Preface

This ES chapter has been revised to reflect the following:

- Appendix 14.1 has been added to this ES, providing details of the modelling of transport and energy emissions.

The significance of potential climate change and greenhouse gas effects have been reevaluated and, where significant adverse residual effects were stated for the all stages of the Development and cumulative effects in the 2021 ES, the significance of potential likely significant effects has been reduced to minor adverse, alone and in-combination with cumulative schemes. These changes in predicted significance are principally through the application of new industry guidance since submission of the 2021 ES in defining likely significance effects.

An assessment of climate change resilience of the Development has now been carried out (Part B of this Chapter). This has not identified any significant effects.

14.1 Introduction

14.1.1 This chapter of the ES was prepared by Ecolyse Limited and presents an assessment of the likely significant effects of the Development on Climate Change.

14.1.2 The assessment is presented in two parts:

- Part A assesses the likely significant effects of the Development on Climate Change through an assessment of the Development's whole life Greenhouse gases (GHG) footprint and determines its significance in the context of local and national climate change policy. Results are presented separately for the Enabling Works, the Eastern Development, the Western Development and considered together for the Enabling Works and Development as a whole, and
- Part B considers the resilience of the Development to future changes in climate.

14.1.3 Mitigation measures are identified, where appropriate, to avoid, reduce or offset any significant adverse effects identified and / or enhance likely beneficial effects. The nature and significance of the likely residual effects are reported.

14.1.4 Potential effects associated with the combined impacts of the Development and climate change on environmental receptors are considered in the supporting documents and EIA chapters where relevant.

14.1.5 Appendix 14.1 provides details on modelling of transport and energy GHG emissions.

Competence

14.1.6 The assessment was led by Dr Graham Earl (PhD, IMechE), Director at Ecolyse Ltd. and supported by Laurence Caird (MEarthSci, CSci, MIES, MIAQM), Associate Director at Air Quality Consultants Ltd (AQC).

14.1.7 Dr Earl has over 25 years' experience in the fields of climate change, environment and asset management and assessment. Since the formation of Ecolyse six years ago, Dr Earl has developed approaches to assessing GHG emissions and climate change for EIA and has specialised in the assessment of climate change, and preparation of GHG inventories and climate resilience assessments for the purposes of EIAs for numerous light industrial, mixed used housing developments, as well as major infrastructure projects.

14.1.8 Mr Caird has over 18 years' experience in the fields of air quality and greenhouse gas emissions. He has helped shape a methodology for the assessment of greenhouse gas emissions within EIA to satisfy the requirements of the EIA Regulations and has produced carbon footprints and greenhouse gas assessments for numerous projects requiring EIAs including major residential, commercial and mixed-use developments and industrial facilities.

14.2 Legislation, Planning Policy and Guidance

Legislation Context

14.2.1 The following legislation is relevant to the Development:

- Climate Change Act (2008)[1];
- Climate Change Act 2008 (2050 Target Amendment) Order 2019[2]; and
- Town and Country Planning (Environmental Impact Assessment) Regulations 2017[3] (as amended)[4].

Planning Policy Context

National

14.2.2 The following national planning policy is relevant to the Development:

- National Planning Policy Framework (2023)[5].

Local

14.2.3 The following local planning policy is relevant to the Development:

- The Cherwell Local Plan 2011 – 2031[6], Policy Bicester 1: North West Bicester Eco-Town, and Ensuring Sustainable development (ESD) Policies 1 to 5.

Guidance

14.2.4 The following guidance is relevant to GHG assessment of the Development:

- IEMA Guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022)[7] ('IEMA Guidance');
- The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard (GHG Protocol) (2001)[8];
- Publicly Available Standard (PAS) 2080: 2023 – Carbon Management in Infrastructure (2023)[9];
- Committee on Climate Change (CCC), Net Zero Technical Report, (2019)[10];
- CCC, Sixth Carbon Budget, (2021)[11];

- HM Government, Net Zero Strategy: Build Back Greener (2021)[12];
- HM Government, Carbon Budget Delivery Plan, (2023)[13]
- Royal Institution of Chartered Surveyors (RICS): Whole life carbon assessment for the built environment, 1st edition (2017)[14], and 2nd edition[15] (2023);
- British Standard EN15978:2011 - Sustainability of construction works (2011)[16];
- 2020 Climate Action Framework, Transforming Cherwell[17];
- Cherwell District Council (CDC) Climate Emergency Declaration 2019[18]; and
- CDC, Greenhouse Gas Report, Reporting Year 2019 to 2020[19].

14.2.5 The following guidance is relevant to resilience of the Development to climate change:

- IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (2020)[20];
- The UK Climate Projections 2018 (UKCP18) [21];
- Met Office UK (2023) UK Climate Projections: Headline Findings [22];
- The National Adaptation Programme (NAP) and the Third Strategy for Climate Adaptation Reporting (DEFRA, 2018) [23]; and
- UK Climate Change Risk Assessment 2022 (HM Government, 2022)[24].

14.3 Consultation

14.3.1 An EIA Scoping Report was submitted to CDC in June 2021 (Appendix 3.2). A Scoping Opinion was received on the 29th July 2021 (Appendix 3.3). CDC agreed with the proposed approach of assessment with no other substantiative comments. No comments have been raised by other consultees of relevance to this assessment.

Part A: Greenhouse Gas Assessment

14.4 Assessment Methodology

Study Area and Scope

14.4.1 GHGs are gaseous compounds that have been identified as contributing to a warming effect in the earth's atmosphere. The primary GHG of concern with respect to the Development is carbon dioxide (CO_2) which is emitted from combustion sources such as vehicular transport and heating and energy plant. Other GHGs also contribute to climate change and these are accounted for based on their Global Warming Potential (GWP). The combined effect of all GHG emissions will be presented as carbon dioxide equivalent (CO_2e) and will account for the seven GHGs included in the United Nations Framework Convention on Climate Change's (UNFCCC) Kyoto Protocol. These are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6), and nitrogen trifluoride (NF_3).

14.4.2 The scope of the GHG assessment is defined through its:

- Geographic scope;
- Temporal scope; and
- The activities contributing to GHG emissions.

14.4.3 Each is described further below.

Geographic Scope

14.4.4 GHGs contribute to climate change, which is a global environmental effect and as such the study area for the assessment is not limited by any specific geographical scope or defined by specific sensitive receptors.

14.4.5 The geographic scope is therefore determined by identifying emission sources associated with the Development over which the Applicant has some ability to control or influence, as detailed further below. These are considered separately for the Enabling Works, the Eastern and Western Developments.

Temporal Scope

14.4.6 The temporal scope is consistent with assessing the whole lifecycle GHG emissions from the Development. The assessment considers the construction and operational phase of the Development as follows:

- **Enabling and Construction Phase:** Direct and indirect GHG emissions resulting from the Development over the enabling and construction period, assumed to be 1.5 years commencing in 2025 and completing in 2026.
- **Operational Phase:** Direct and indirect GHG emissions resulting from the Development in the opening year of the completed Development, assumed to be 2026. The assessment specifically considers the GHG emissions in the opening year as it is likely that these represent the worst case annual GHG emissions for the Development over its lifetime. This is because the economy will be decarbonising over time consistent with meeting the UK's climate change target to be net zero by 2050

and this will act to reduce GHG emissions associated with the Development. Consideration is also given to likely pathways of GHG emissions from the Development out to 2050.

Activities Contributing to GHG Emissions

14.4.7 The following activities contribute to GHG emissions from the Enabling Works:

- Transportation of earthwork materials.

14.4.8 The following activities contribute to GHG emissions from the construction of the Development and to both the Eastern and Western Developments:

- Transport of construction materials to the Site; and
- Emissions embodied in the materials used to construct the Site, from construction machinery and any waste.

14.4.9 The following activities contribute to GHG emissions from the operation of the completed Development and apply to the Eastern and Western Developments:

- Operational energy used by the Development;
- Operational transport activities related to the Development; and
- Repair, maintenance and refurbishment of the Development during its lifetime.

14.4.10 A small number of minor activities were scoped out consistent with IEMA[7] guidance. IEMA recommends that activities with emissions that in total equal less than 5% of the lifecycle emissions of the Development may be scoped out of the assessment. Activities scoped out are as follows:

- Enabling Works and Construction of the Eastern and Western Developments:
  - Emissions from site activities such as energy consumption in site offices and welfare facilities, and fuel use of diesel-powered plant during the Enabling Works.
  - GHG emissions due to land use change – Likely to be minimal and be less than 1% of lifetime emissions. Any net increase in land use GHG emissions from each Development (Eastern and Western) will be minimised through the biodiversity and landscape planning for the respective Sites.
- Completed Development:
  - GHG emissions from the treatment and disposal of waste materials – these are a very small component of the GHG emissions of each Development and will be minimised through standard best practice including the implementation of operational waste management plans.
  - GHG emissions associated with water use (including water treatment and supply (pumping)) – these are expected to result in very small contributions to lifetime GHG emissions.

14.4.11 Emissions from decommissioning the Development at the end of its life were also scoped out of the assessment. End of life emissions include demolition of the buildings, transport of waste, processing of waste and disposal. The UK has committed to achieve net zero carbon emissions from 2050 onwards, therefore by the end of each building's life (over 60 years from completion) it can reasonably be expected that emissions from demolition,

transport and waste processing will be net zero. Any residual emissions from waste disposal will be minimal as the waste is largely inert and recyclable and any such emissions will represent a very small proportion of each Development's GHG footprint. As such, it is not considered necessary to include end of life emissions estimates within the assessment.

Establishing Baseline Conditions

14.4.12 The Site is undeveloped land and there are currently no activities resulting in GHG emissions.

14.4.13 Therefore, the existing and future baseline GHG emissions for the purposes of this assessment were considered to be zero, which is a conservative worst-case assumption.

Identifying Likely Significant Effects

14.4.14 The assessment considered the whole life GHG emissions from the Development. This included GHG emissions during the enabling, construction and operational phases of the Development.

14.4.15 The GHG assessment of effects is structured as follows:

- Quantification of whole life GHG emissions from the Development;
- Assessment of the likely significant; and
- Assessment of residual effects.

Enabling Works and Construction

14.4.16 The assessment of GHG emissions for the Eastern and Western Developments during the Enabling Works and Construction used the following approaches:

- The embodied GHG emissions from construction materials, construction equipment and construction waste materials were taken from the Lifecycle Assessment (LCA) completed in support of the BREEAM assessment. The LCA assessment complied with British Standard EN15978 Assessment of Environmental Performance of buildings[16] and considered all the upstream and downstream processes needed to construct the building; and
- GHG emissions from construction traffic during the Enabling Works and construction phase were calculated based on predicted construction traffic movements provided by David Tucker Associates (the project transport consultants), average travel distances based on RICS benchmarks[14] and latest government published[25] GHG emission factors for construction vehicles.

Completed Development

14.4.17 The assessment of operational effects of the completed Eastern and Western Developments adopted the following approaches:

- GHG emissions from operational transport were calculated using government published GHG emission factors for transport modes[25], transport modelling of delivery vehicles, and staff annual trips, as well as trip distance information provided by the David Tucker Associates. Whole life traffic GHG emissions were modelled based on published strategies for decarbonisation of the electricity grid and transport modes reflecting UK climate change policy and strategies (see also Appendix 14.1);

- GHG emissions associated with the repair, maintenance and refurbishment of the building during its lifetime are based on the LCA completed in support of the BREEAM assessment;
- GHG emissions from operational energy consumption were based on energy modelling and industry benchmarks[26]. The whole life emissions from energy use were modelled using DESNZ green book emission factors[27] to account for grid decarbonisation as detailed in Appendix 14.1; and

14.4.18 The net increase in GHG emissions from the Enabling Works, construction and during operation in the opening year for the Eastern and Western Developments and both combined (i.e. the Development) was calculated by comparison to the future baseline emissions, which in this case is assumed to be zero.

14.4.19 The assessment presents the GHG mitigation being proposed, which follows the principles of the GHG management hierarchy (avoid, reduce, off-set), to minimise, as far as reasonably practicable, the anticipated GHG emissions over each Development's lifecycle.

Cumulative Effects

14.4.20 The IEMA Guidance makes clear that climate change is *"the largest interrelated cumulative environmental effect"* and therefore the assessment of GHG emissions which contribute to climate is intrinsically cumulative.

14.4.21 On this point IEMA state that *"The atmospheric concentration of GHGs and resulting effect on climate change is affected by all sources and sinks globally, anthropogenic and otherwise. As GHG emission impacts and resulting effects are global rather than affecting one localised area, the approach to cumulative effects assessment for GHGs differs from that for many EIA topics where only projects within a geographically bounded study area of, for example, 10km would be included".*

14.4.22 In terms of this assessment the following are therefore relevant:

- The assessment will consider the effects of the Development in the context of national and local cumulative totals. Since the national totals assume that other developments will contribute GHGs, the assessment will consider their implications in determining significance; and
- The geographical location of emissions has no relevance to the assessment. Therefore, the effects of the Development are independent of any local cumulative emissions.

14.4.23 Therefore, the effects of the Enabling Works, Eastern and Western Developments in isolation and when considered together as the Development are independent of any local cumulative emissions.

14.4.24 The quantification of the GHG emissions associated with cumulative developments was therefore scoped out of this chapter. The cumulative GHG effects with other local developments are considered to be the same as those in each of the scenarios considered by this assessment, e.g. the completed Eastern and Western Developments in isolation and for the Development.

14.4.25 This is consistent with IEMA Guidance which states that *"Effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed, as*

there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other".

Determining Effect Significance

14.4.26 For GHG emissions there are no recognised significance criteria and thresholds that relate to the quantum of GHG emissions released.

14.4.27 The approach to classifying and defining likely significant effects therefore relies on IEMA Guidance[7] and applying expert judgment on the significance of the Development's lifecycle GHG emissions taking into account their context, compliance with policy, and mitigation measures.

14.4.28 The IEMA Guidance defines five distinct levels of significance (see Table 14-1) later in this section) which are not solely based on whether a project emits GHG emissions alone, but the degree to which the project's GHG emissions are consistent with science-based 1.5°C aligned emission trajectories towards net zero. For the UK these trajectories are effectively defined by carbon budgets, including any sectoral pathways that are designed to achieve the UK's 2050 net zero target.

14.4.29 IEMA established three underlying principles, which informed its approach to significance, as follows:

- The GHG emissions from all projects will contribute to climate change, the largest interrelated cumulative environmental effect;
- The consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive – e.g., population, fauna and soil; and
- GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant.

14.4.30 Based on these principles, IEMA conclude 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 lifetime, which may be positive, negative or negligible.
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages.
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

14.4.31 In advising on the significance of any net change in GHG emission resulting from a development, IEMA identify that, to limit the adverse effects from climate change, global temperature change needs to be limited to well below 2ºC, aiming for 1.5ºC. The implication of this objective is that global emissions need to fall to net zero by 2050.

14.4.32 The UK's response to limiting climate change is enshrined in law through the Climate Change Act which requires the UK economy to be net zero by 2050 following a trajectory

set through 5 yearly carbon budgets. The 2050 target (and interim budgets set to date) are, according to the CCC, compatible with the required magnitude and rate of GHG emissions reductions required in the UK to meet the goals of the Paris Agreement[1], thereby limiting severe adverse effects.

14.4.33 It follows that the significance of any net change of GHG resulting from a development is not so much whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions consistent with a trajectory towards net zero by 2050.

14.4.34 To establish the significance of the GHG emissions from the Development, judgements were made on:

- the Development's consistency with policy requirements, since these are specified to ensure the economy decarbonises in line with the UK's net zero target; and
- the degree to which the Development has sought to mitigate its emissions.

14.4.35 Examining each of these dimensions allows the assessment to make professional judgement on the likely significance of effects based on a set of significance criteria established in the IEMA Guidance, summarised in Table 14-1.

Table 14-1: GHG Significance Criteria (based on IEMA Guidance[7])

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, regional 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, regional 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 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.

[1] International treaty adopted at the Conference of Parties 21 in Paris in December 2015 setting global goal to limit climate change to less than 2 degrees Celsius, preferably to 1.5 degrees Celsius compared to pre-industrial levels.

Significance Rating	Description	Criteria to determine significance of net GHG emissions
	the UK's trajectory towards net zero.	
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.

14.4.36 IEMA Guidance also advise that:

- Major adverse, moderate adverse and beneficial effects should be considered significant in the context of EIA. Consequently, negligible and minor adverse are considered not significant;
- In the case of large-scale developments, irrespective of the level of mitigation if net GHG emissions exceed 5% of UK or devolved administrations carbon budget, that this is a level of change that is considered significant;
- Meeting the minimum standards set through existing policy or regulation cannot necessarily be taken as evidence of avoiding a significant adverse effect, and it is recommended therefore that the assessment also considers emerging policy / standards and the guidance of expert bodies such as the CCC on necessary policy developments, particularly for multi-phased projects with long timescales; and
- To aid decision making, it is important 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 reported in the EIA in way that aids evaluation of these effects by the decision maker. IEMA advise that context can be provided through comparison of the whole life GHG emissions resulting from the Development with national, local and carbon budgets.

14.4.37 Therefore, the assessment of significance is established over two steps as follows:

Step 1: Establish Context of GHG Emissions

14.4.38 Context for decision making is provided by comparing the net change in the whole life GHG emissions resulting from the Development with local and national GHG emissions totals, and carbon budgets.

Step 2: Determine Significance of Effects

14.4.39 Significance of effects is established through applying the criteria detailed in Table 14-1 based on professional judgement that considers:

- Step 2a: The consistency of the Development with national, regional and local policies designed to limit GHG emissions and meet the UK's net zero target; and
- Step 2b: The robustness, timeliness and efficacy of mitigation measures proposed to avoid, reduce and compensate GHG emissions.

14.4.40 In terms of mitigation, IEMA recommends that mitigation should in the first instance seek to avoid GHG emissions. Where GHG emissions cannot be avoided, the development should aim to reduce the residual significance of its emissions at all stages. Where additional GHG emissions remain but cannot be further reduced at source, approaches should be considered that compensate for the Development's remaining emissions, for example through offsetting.

Sensitivity of Receptor

14.4.41 The assessment of climate change does not include identification of sensitive receptors, as GHG emissions do not directly affect specific locations, but lead to indirect effects by contributing to climate change.

Assumptions and Limitations

14.4.42 It is necessary to make a number of assumptions when carrying out a greenhouse gas assessment, although assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment include:

- A number of emission sources were scoped out as detailed in para 14.4.10 and 14.4.11, although these are all minor and would not affect the conclusions of the assessment.
- In relation to Enabling Works, and construction and operational traffic movements of the Development, some assumptions were made on trip distance. Average trip distances were adopted to be conservative and ensure a realistic worst case.
- Assumptions have been made on the rate of future decarbonisation of transport modes and electricity generation. These are detailed in Appendix 14.1.

14.5 Baseline Conditions

14.5.1 As described in Section 14.4 (paragraph 14.4.12), the baseline GHG emissions for the Eastern and Western Sites is taken to be zero.

Future Baseline

14.5.2 As identified in Section 14.4 (paragraph 14.4.12), were the Eastern or Western Developments to not come forward, the GHG emissions for the Site would remain at zero.

14.6 Scheme Design and Management

Enabling and Construction

14.6.1 Measures will be undertaken during the Enabling Works and the construction phase of the Development in order to minimise generation of GHG emissions. This includes adherence

to CEMPs that will seek to minimise construction waste (and therefore embodied carbon), use of energy during construction and promote use of fuel-efficient construction vehicles.

14.6.2 Additionally, the CEMPs will include a construction logistics plan to minimise the number of construction trips. The CEMPs will apply equally to the Enabling Works, Eastern and Western Developments, with Framework CEMPs in Appendices 6.1 and 6.2 setting out the key principles that will be adhered to.

14.6.3 The Eastern and Western Developments will be assessed under BREEAM New Construction (NC) 2018, with a target to achieve a "Very Good" rating with aspirations / capabilities to achieve Excellent.

14.6.4 Reducing GHG emissions from the construction works will include a focus on procurement of sustainable materials that minimise embodied GHG emissions where feasible consistent with meeting BREEAM "Very Good" rating.

Completed Development

14.6.5 The Eastern and Western Developments have adopted best practice design and use of construction materials to minimise energy consumption of the Site and includes the following:

- Effective built form and orientation and proficient location of services such that the building design of the Development is optimised for energy efficiency;
- Use of passive design and energy efficiency features, including building fabrics with good practice levels of insulation and low air permeability, to improve on the Energy Efficiency Standards set out in the building regulations;
- Installation of Photovoltaic (PV) panels on roof areas;
- Installation of highly efficient Air-Source Heat Pumps (ASHPs) to regulate temperature; and
- Use of high efficiency LED lighting utilising low-energy control systems such as daylight dimming and occupancy sensing, where applicable.

14.6.6 These measures are primary (inherent design) and can therefore be relied on for the purposes of the assessment.

14.6.7 In addition, the Eastern and Western Developments make provision for electric vehicle (EV) charging spaces for both HGVs and cars, dedicated cycle parking and new bus stops on the site access roads to the Eastern and Western Developments. These are also considered as primary mitigation measures.

14.6.8 Finally, a comprehensive set of design measures have been adopted to ensure the buildings on the Eastern and Western Sites are resilient to future climate change. These are detailed in Part B and are also considered as primary mitigation measures.

14.7 Assessment of GHG Effects

14.7.1 The climate change assessment considers the whole life GHG emissions resulting from the Enabling Works, the construction and the operation of the Eastern and Western

Development and the Development (i.e. Enabling Works, Eastern and Western Developments combined).

Quantification of Whole Life GHG Emissions from the Development[2]

Construction – Embodied in materials, from construction machinery and waste materials

14.7.2 As described in Paragraph 14.4.16, the embodied GHGs in construction materials, from construction activity and waste materials is taken from the LCA for the construction of the Eastern and Western Developments. The use of any materials is minimal during the Enabling Works and therefore there are no embodied GHG emissions associated with this phase. The LCA calculates these GHG emissions as follows:

- Eastern Development = 18,483 tonnes CO_2e;
- Western Development = 31,704 tonnes CO_2e; and
- Development = 50,187 tonnes CO_2e.

14.7.3 Based on a construction period of 1.5 years, this equates to the following annualised GHG emissions for each scenario, as follows:

- Eastern Development = 12,322 tonnes CO_2e/ annum;
- Western Development = 21,136 tonnes CO_2e/annum; and
- Development = 33,458 tonnes CO_2e/annum.

Enabling and Construction – Transport

14.7.4 In addition to embodied carbon in the materials used for construction, GHG emissions will be created by transportation during the Enabling Works and construction phase. The calculation of enabling and construction transport related GHG emissions for the Enabling works, Eastern Development, The Western Development and the Development scenario is presented in Table 14-2 to Table 14-5 respectively.

14.7.5 The assessment multiplies government published GHG emission factors[25] for delivery vehicles (modelled separately as Heavy Good Vehicles (HGV) over 3.5 tonnes and vans below 3.5 tonnes) by the number of construction trips modelled by the Transport Assessment (Appendix 8.1) and by trip distance. Trip distances are estimated to be 50km for locally sourced materials (e.g. concrete, aggregates etc) and 300km for nationally manufactured materials (e.g. plasterboard, roofing, façades etc.) based on guidance provide by RICS[14]. It is assumed that during the Enabling Works all trips are local. During the construction phase 50% of HGV delivery vehicles are local and 50% national, and 100% of van delivery vehicles are local.

[2] All GHG values reported in this section are rounded to the nearest whole tonne.

Table 14-2: Calculation of GHG from Enabling Works Traffic

Mode	2023 Emission Factor ($kgCO_2e/km$)	Distance Travelled (km)		Total CO_2e Emissions (tonnes)[3]
		Number enabling work return trips	Average round trip distance (km)	
HGV local trip	0.90784 full laden 0.65828 empty	7,300	50 km	286
HGV national trip		0	300 km	0
Van local delivery	0.23037	27,375	50 km	315
Total				601

Table 14-3: Calculation of GHG from Construction Traffic: Eastern Development

Mode	2023 Emission Factor ($kgCO_2e/km$)	Distance Travelled (km)		Total CO_2e Emissions (tonnes)[3]
		Number construction deliveries / return trips	Average round trip distance (km)	
HGV local delivery	0.90784 full laden 0.65828 empty	10,950	50 km	429
HGV national delivery		10,950	300 km	2,572
Van local delivery	0.23037	82,125	50 km	946
Total				3,947

Table 14-4: Calculation of GHG from Construction Traffic: Western Development

Mode	2023 Emission Factor (kgCO2e/km)	Distance Travelled (km)		Total CO_2e Emissions (tonnes) [3]
		Number construction deliveries / return trips	Average round trip distance (km)	
HGV local delivery	0.90784 full laden 0.65828 empty	14,600	50 km	572
HGV national delivery		14,600	300 km	3,430
Van local delivery	0.23037	109,500	50 km	1,261
Total				5,263

[3] Calculated by multiplying round trip distance by number of return trips by average of fully laden and empty emission factor as appropriate

Table 14-5 : Calculation of GHG from Construction Traffic: Development

Mode	2023 Emission Factor ($kgCO_2e/km$)	Distance Travelled (km)		Total CO_2e Emissions (tonnes)[3]
		Number construction deliveries / return trips	Average round trip distance (km)	
HGV local delivery	0.90784 full laden 0.65828 empty	29,200	50 km	1,286
HGV national delivery		29,200	300 km	6,002
Van local delivery	0.23037	219,000	50 km	2,523
Total				9,811

14.7.6 The total GHG from construction traffic, is calculated as:

- Enabling Works = 601 tonnes CO_2e;
- Eastern Development = 3,947 tonnes CO_2e;
- Western Development = 5,263 tonnes CO_2e; and
- Development = 9,811 tonnes CO_2e.

14.7.7 Based on a construction period of 1.5 years, this equates to the following annualised GHG emissions for each scenario, as follows:

- Enabling Works = 401 tonnes CO2e/ annum;
- Eastern Development = 2,631 tonnes CO2e/ annum;
- Western Development = 3,508 tonnes CO2e/annum; and
- Development = 6,541 tonnes CO2e/annum.

Operation – Repair, Maintenance and Refurbishment

14.7.8 The GHG emission from the repair, maintenance and refurbishment of each Development scenario over its lifetime have been estimated by the LCA as:

- Eastern Development = 544 tonnes CO_2e;
- Western Development = 934 tonnes CO_2e; and
- Development= 1,478 tonnes CO_2e.

14.7.9 Based on a development lifetime of 60 years, this equates to the following annualised GHG emissions for each scenario, as follows:

- Eastern Development = 9 tonnes CO_2e/ annum;
- Western Development = 16 tonnes CO_2e/annum; and
- Development = 25 tonnes CO_2e/annum.

Operation – Transport

14.7.10 The transport related GHG emissions for each Development scenario in the opening year (2026) are presented in Table 14-6 to Table 14-8. The assessment multiplies GHG emission factors published by DEZNZ[25] adjusted for 2026 for each mode of travel by the number of annual trips by mode (calculated using Trip Generation data provided through the Transport Assessment) by average trip distance by mode.

Table 14-6: Assessment of Transport GHG Emissions from the Eastern Development (2026)

Type	Mode	Emission Factors (CO_2e per km or passenger km)	Annual distance travelled (million km per annum)	CO_2e Tonnes (per annum)
Employees	Bus	0.114558252	0.74	85
	Motorcycle	0.103102345	0.3	31
	Car	0.14631703	10.8	1,580
	Passenger in car	0.073158515	1.71	125
	Bicycle	0	0.47	-
	Pedestrian	0	0.02	-
Operational vehicles	HGV (average laden)	0.802555772	30	24,077
Total				25,898

Table 14-7: Assessment of Transport GHG Emissions from the Western Development (2026)

Type	Mode	Emission Factors (CO_2e per km or passenger km)	Annual distance travelled (million km per annum)	CO_2e Tonnes (per annum)
Employees	Bus	0.114558252	1.32	151
	Motorcycle	0.103102345	0.54	56
	Car	0.14631703	19.44	2,844
	Passenger in car	0.073158515	3.07	225
	Bicycle	0	0.85	-
	Pedestrian	0	0.04	-
Operational vehicles	HGV (average laden)	0.802555772	54	43,338

Type	Mode	Emission Factors (CO_2e per km or passenger km)	Annual distance travelled (million km per annum)	CO_2e Tonnes (per annum)
Total				46,614

Table 14-8 : Assessment of Transport GHG Emissions from the Development (2026)

Type	Mode	Emission Factors (CO_2e per km or passenger km)	Annual distance travelled (million km per annum)	CO_2e Tonnes (per annum)
Employees	Bus	0.114558252	2.06	236
	Motorcycle	0.103102345	0.84	87
	Car	0.14631703	30.24	4,425
	Passenger in car	0.073158515	4.78	350
	Bicycle	0	1.32	-
	Pedestrian	0	0.06	-
Operational vehicles	HGV (average laden)	0.802555772	84	67,415
Total				72,512

14.7.11 The GHG emissions from transport in the opening year for each Development scenario are therefore:

- Eastern Development = 25,898 tonnes CO_2e/ annum;
- Western Development = 46,614 tonnes CO_2e/annum; and
- Development = 72,512 tonnes CO_2e/annum.

14.7.12 GHG emissions from transport over the 60 year lifetime are also calculated and detailed in Appendix 14.1. Lifetime transport emissions for each Development scenario are:

- Eastern Development = 676,730 tonnes CO_2e;
- Western Development = 1,212,019 CO_2e; and
- Development = 1,888,750 tonnes CO_2e.

Operation – Energy Consumption

14.7.13 The CO_2 emissions from energy consumption of each Development scenario are calculated based on the building energy assessment modelling undertaken to inform the design.

14.7.14 This has calculated the energy consumption for the office space and core elements of the buildings on the Eastern and Western Developments. The energy consumption of the warehouse elements has been estimated based on industry benchmarks, e.g. CIBSE[28], since the warehouse element fit out is not defined and is to be subject to outline planning permission. Additionally, the amount of PV provision has been calculated to ensure all the office and core energy demand is met through onsite renewable energy. Energy consumption is converted to CO_2 based on SAP10 emission factors to ensure consistency with energy modelling. SAP10 emission factors are more conservative than DEZNZ[25] CO_2e emissions factors and therefore the assessment is worst case.

14.7.15 Table 14-9 to Table 14-11 summarise the opening year GHG emissions for the office and core and warehouse elements of each Development including any provision for PV to offset energy demand.

Table 14-9: Opening year (2026) assessment of CO_2 Emissions from Energy Consumption - Eastern Development

	Emissions before PV mitigation (Tonnes CO_2 per annum)	Offset through PV (Tonnes CO_2 per annum)	Net emissions (Tonnes CO_2 per annum)
Office and core	221	305	-84
Warehouse	1,723	0	1,723
Total	1,944	305	1639

Table 14-10: Opening year (2026) assessment of CO_2 Emissions from Energy Consumption - Western Development

	Emissions before PV mitigation (Tonnes CO_2 per annum)	Offset through PV (Tonnes CO_2 per annum)	Net emissions (Tonnes CO_2 per annum)
Office and core	362	488	-126
Warehouse	2,963	0	2,963
Total	3,325	488	2,837

Table 14-11: Opening year (2026) assessment of CO_2 Emissions from Energy Consumption - Development

	Emissions before PV mitigation (Tonnes CO_2 per annum)	Offset through PV (Tonnes CO_2 per annum)	Net emissions (tonnes CO_2 per annum)
Office and core	583	793	-210
Warehouse	4,686	0	4,686
Total	5,269	793	4,476

14.7.16 The total net GHG emissions from energy consumption in the opening year (2026) are therefore:

- Eastern Development = 1,639 tonnes CO_2/ annum;
- Western Development = 2,837 tonnes CO_2/annum; and
- Development = 4,476 tonnes CO_2/annum.

14.7.17 GHG emissions from energy consumption over the 60 year lifetime are also calculated and detailed in Appendix 14.1. Lifetime energy emissions for each Development scenario are:

- Eastern Development = 12,261 tonnes CO_2e;
- Western Development = 21,229 CO_2e; and
- Development = 33,490 tonnes CO_2e.

Total GHG Emission Footprint

14.7.18 Table 14-12 to Table 14-15 summarise the net GHG emissions for each Development scenario in the opening year and lifetime for each footprint element.

Table 14-12: Net GHG Footprint for the Enabling Works

Development Phase	Footprint Element	Net tonnes of CO_2e	
		Opening Year	Lifetime
Enabling Works	Transport	401	601
Total		401	601

Table 14-13: Net GHG Footprint for the Eastern Development for Opening Year

Development Phase	Footprint Element	Tonnes of CO_2e	
		Opening Year	Lifetime
Construction	Embodied / waste / construction	12,322	18,483
	Transport	2,631	3,947
Operation	Repair, maintenance and refurbishment	9	544
	Transport	25,898	676,730
	Energy	1,639	12,261
Total		42,499	711,966

Table 14-14: Net GHG Footprint for the Western Development

Development Phase	Footprint Element	Tonnes of CO_2e	
		Opening Year	Lifetime
Construction	Embodied / waste / construction	21,136	31,704

Development Phase	Footprint Element	Tonnes of CO_2e	
		Opening Year	Lifetime
	Transport	3,508	5,263
Operation	Repair, maintenance and refurbishment	16	934
	Transport	46,614	1,212,019
	Energy	2,838	21,229
Total		74,111	1,271,149

Table 14-15: Net GHG Footprint for the Combined Development

Development Phase	Footprint Element	Tonnes of CO_2e	
		Opening Year	Lifetime
Enabling Works	Transport	401	601
Construction	Embodied / waste / construction	33,458	50,187
	Transport	6,140	9,210
Operation	Repair, maintenance and refurbishment	25	1,478
	Transport	72,512	1,888,750
	Energy	4,476	33,490
Total		117,011	1,983,715

14.7.19 For each scenario the most significant lifetime source of GHG emissions is from operational transport which represent approximately 95% of the net change in each scenario.

Assessment of Significance of Effects

14.7.20 The assessment of the significance of the GHG emissions is informed through IEMA Guidance detailed in Section 14.4 and follows a 2-step process detailed below.

Step 1: Establish Context

14.7.21 The GHG emissions from the Development are compared to national and local CO_2e totals to establish context.

National

14.7.22 The UK has legislated a 2050 net zero target following recommendations and analysis completed by the CCC[10]. To meet this target the CCC sets carbon budgets to define a pathway to net zero.

14.7.23 The opening year emissions for the Development coincide with the 4th carbon budget covering the period 2023 to 2027. The 4th carbon budget has been set as 1,950 million tonnes (MT) CO_2e, or an average annual budget of 390 MT CO_2e. Comparing the Development's opening year GHG emissions (including transport) to the national carbon budget shows that under each scenario this is:

- Enabling Works = 0.0001% of 4th carbon budget;
- Eastern Development = 0.011% of 4th carbon budget;
- Western Development = 0.019% of 4th carbon budget; and
- Development = 0.030% of 4th carbon budget.

14.7.24 The contribution is therefore a very small contributor under each Development scenario.

Local

14.7.25 The University of Manchester Tyndall Centre[29] has published year by year local authority GHG targets for energy consumption that are consistent with meeting the Paris Agreement. In the opening year, 2026, the Tyndall Centre estimates a target GHG emission from energy consumption for CDC of 500,000 tonnes CO_2e per annum.

14.7.26 Comparing the GHG opening year energy emissions from each scenario shows that this would be:

- Enabling Works = 0.0% of CDC emissions;
- Eastern Development = 0.3% of CDC emissions;
- Western Development = 0.6% of CDC emissions; and
- Development = 0.9% of CDC emissions.

14.7.27 The contribution is therefore a small contributor under each Development scenario.

Step 2: Determine Significance

14.7.28 Significance of effects is established through applying the criteria detailed in Table 14-1. This requires judgments on:

a) The consistency of the Development with national, regional and local policies designed to limit GHG emissions and meet the UK's net zero target; and

b) The robustness, timeliness and efficacy of mitigation measures proposed to avoid, reduce and compensate GHG.

14.7.29 Each is considered further below.

Step 2a: Consistency of the Development with National and Local Policies

National

14.7.30 The NPPF sets out the Government's planning policies for England and how these should be applied, both in drawing up plans and making decisions about planning applications.

14.7.31 Paragraph 157 states:

"The planning system should support the transition to a low carbon future in a changing climate… shape places in ways that contribute to radical reductions in greenhouse gas emissions… and support renewable and low carbon energy and associated infrastructure".

14.7.32 Paragraph 159 states that:

"New development should be planned for in ways that (…) can help to reduce greenhouse gas emissions, such as through its location, orientation and design."

14.7.33 Paragraph 162 states that: "*in determining planning applications, local planning authorities should expect new development to:*

a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and

b) take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

14.7.34 Paragraph 194 states that *"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively."*

14.7.35 In terms of national climate change policy, the CCC[10,11] has established a "balanced net zero pathway" which considers feasible and cost-effective policy and technology interventions to ensure the UK can meet its new net zero target.

14.7.36 For power generation under this scenario, the CCC consider that 100% of power generation by 2050 will be low carbon and for ground transport it forecasts that all ground transportation (apart from small number of HGVs) will be electrically powered. The CCC therefore forecast that power and ground transportation sectors are largely decarbonised by 2050 with any residual emissions removed through technical and or natural means.

14.7.37 In response to the CCC's advice government has published a Net Zero Strategy[12] as well as a more recent Carbon Budget Delivery Plan[13] both of which set out policies government plans to adopt to deliver legislated Carbon Budgets and the 2050 net zero target.

14.7.38 It is therefore reasonable to assume that national policy measures will ensure that energy and transport emissions relating to the Development will be decarbonised consistent with the UK's net zero target.

14.7.39 Importantly the Development has adopted measures that are supportive and complaint with national policies to meet net zero consistent with the CCC's balanced net zero pathway, the government's Net Zero Strategy and the NPPF. Specifically, this includes:

- Installing EV charging points to accommodate charging requirements of electric vehicles;
- Adherence to a CEMP and design measures that include focus on procurement of sustainable materials that minimise embodied GHG emissions where feasible consistent with meeting BREEAM "Excellent" rating;
- Energy measures that result in energy efficiency improvement vs Part L 2021;
- Use of low carbon technology such as ASHP and renewable energy sources such as PV cells; and
- Transport planning measures aimed at increasing use of low carbon transport modes.

Local

14.7.40 The relevant local policies are Policy Ensuring Sustainable Development (ESD) Policies 1 to 5, and Policy Bicester 1: North West Bicester Eco-Town[6]. Each is summarised further below, with an assessment of the Development's performance with the policy.

14.7.41 Policy ESD 1: Mitigating and Adapting to Climate Change states that:

"Measures will be taken to mitigate the impact of development within the District on climate change. At a strategic level, this will include:

- *Distributing growth to the most sustainable locations as defined in this Local Plan*
- *Delivering development that seeks to reduce the need to travel and which encourages sustainable travel options including walking, cycling and public transport to reduce dependence on private cars Designing developments to reduce carbon emissions and use resources more efficiently, including water (see Policy ESD 3 Sustainable Construction) Promoting the use of decentralised and renewable or low carbon energy where appropriate (see Policies ESD 4 Decentralised Energy Systems and ESD 5 Renewable Energy).*

The incorporation of suitable adaptation measures in new development to ensure that development is more resilient to climate change impacts will include consideration of the following:

- *Taking into account the known physical and environmental constraints when identifying locations for development*
- *Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling*
- *Minimising the risk of flooding and making use of sustainable drainage methods, and*
- *Reducing the effects of development on the microclimate (through the provision of green infrastructure including open space and water, planting, and green roofs).*

Adaptation through design approaches will be considered in more locally specific detail in the Sustainable Buildings in Cherwell Supplementary Planning Document (SPD).

14.7.42 Policy ESD 2: Energy Hierarchy and Allowable Solutions, states that: CS1 (para 8) states that developments should:

In seeking to achieve carbon emissions reductions, we will promote an 'energy hierarchy' as follows:

- *Reducing energy use, in particular by the use of sustainable design and construction measures*
- *Supplying energy efficiently and giving priority to decentralised energy supply*
- *Making use of renewable energy*
- *Making use of allowable solutions.*

14.7.43 Policy ESD 3: Sustainable Construction, states that:

All new residential development will be expected to incorporate sustainable design and construction technology to achieve zero carbon development through a combination of fabric energy efficiency, carbon compliance and allowable solutions in line with Government policy. Cherwell District is in an area of water stress and as such the Council will seek a higher level of water efficiency than required in the Building Regulations, with developments achieving a limit of 110 litres/person/day. All new non-residential development will be expected to meet at least BREEAM 'Very Good' with immediate effect, subject to review over the plan period to ensure the target remains relevant. The demonstration of the achievement of this standard should be set out in the Energy Statement. The strategic site allocations identified in this Local Plan are expected to provide contributions to carbon emissions reductions and to wider sustainability.

All development proposals will be encouraged to reflect high quality design and high environmental standards, demonstrating sustainable construction methods including but not limited to:

- *Minimising both energy demands and energy loss*
- *Maximising passive solar lighting and natural ventilation*
- *Maximising resource efficiency*
- *Incorporating the use of recycled and energy efficient materials*
- *Incorporating the use of locally sourced building materials*
- *Reducing waste and pollution and making adequate provision for the recycling of waste*
- *Making use of sustainable drainage methods*

- *Reducing the impact on the external environment and maximising opportunities for cooling and shading (by the provision of open space and water, planting, and green roofs, for example); and*

- *Making use of the embodied energy within buildings wherever possible and re-using materials where proposals involve demolition or redevelopment.*

Should the promoters of development consider that individual proposals would be unviable with the above requirements, 'open-book' financial analysis of proposed developments will be expected so that an independent economic viability assessment can be undertaken. Where it is agreed that an economic viability assessment is required, the cost shall be met by the promoter.

14.7.44 Policy ESD 4: Decentralised Energy Systems sets out that:

The use of decentralised energy systems, providing either heating (District Heating (DH)) or heating and power (Combined Heat and Power (CHP)) will be encouraged in all new developments.

A feasibility assessment for DH/CHP, including consideration of biomass fuelled CHP, will be required for:

- *All residential developments for 100 dwellings or more*

- *All residential developments in off-gas areas for 50 dwellings or more*

- *All applications for non-domestic developments above1000m^2 floorspace.*

The feasibility assessment should be informed by the renewable energy map at Appendix5 'Maps' and the national mapping of heat demand densities undertaken by the Department for Energy and Climate Change (DECC) (see Appendix 3: Evidence Base).

Where feasibility assessments demonstrate that decentralised energy systems are deliverable and viable such systems will be required as part of the development unless an alternative solution would deliver the same or increased benefit.

14.7.45 Policy ESD 5: Renewable Energy, sets out that:

The Council supports renewable and low carbon energy provision wherever any adverse impacts can be addressed satisfactorily. The potential local environmental, economic and community benefits of renewable energy schemes will be a material consideration in determining planning applications.

Planning applications involving renewable energy development will be encouraged provided that there is no unacceptable adverse impact, including cumulative impact, on the following issues, which are considered to be of particular local significance in Cherwell:

- *Landscape and biodiversity including designations, protected habitats and species, and Conservation Target Areas*

- *Visual impacts on local landscapes*

- *The historic environment including designated and non-designated assets and their settings*
- *The Green Belt, particularly visual impacts on openness*
- *Aviation activities*
- *Highways and access issues, and*
- *Residential amenity.*

A feasibility assessment of the potential for significant on-site renewable energy provision (above any provision required to meet national building standards) will be required for:

- *All residential developments for 100 dwellings or more*
- *All residential developments in off-gas areas for 50 dwellings or more*
- *All applications for non-domestic developments above1000m^2 floorspace.*

Where feasibility assessments demonstrate that onsite renewable energy provision is deliverable and viable this will be required as part of the development unless an alternative solution would deliver the same or increased benefit. This may include consideration of 'allowable solutions' as Government Policy evolves.

14.7.46 The Development is compliant with:

- ESD 1 based on measures detailed in the Travel Plan and summarised in Section Mitigation Monitoring and Residual Effects, and in Table 14-23
- to ensure resilience to climate change;
- ESD 2 based on inherent design measures to minimise energy consumption (see Section 14.5) and use of PV to ensure GHG emissions from energy use of office and core areas of buildings are zero;
- ESD 3 based on target of "Very Good" under BREEAM including measures to minimise embodied carbon of materials used, design measures to reduce energy demand and use of PV to ensure GHG emissions are zero from office and core areas of buildings; and
- ESD 4 and 5 through use of PV to meet all energy demand for office and core areas thus removing the need for any form of decentralised energy supply.

14.7.47 The Strategic Development: Bicester 1 - North West Bicester Eco-Town policy sets out a serious of requirements, of which the following are considered relevant to this development:

Zero-carbon development as defined in the Eco-Towns PPS and Eco Bicester One Shared Vision.

14.7.48 The Development is compliant with this requirement based on:

- Measures described in the Travel Plan and summarised in paragraphs 14.7.52 and 14.7.53 below to increase the use of low carbon public transport, including installations of EV points to accelerate the take up of EV vehicles at the Development;
- Design measures to ensure the development is resilient to future climate change described further in Part B of this assessment;
- Design measures to minimise energy consumption (see Section 14.5) and use of PV to ensure GHG emissions from energy use in office and core areas of buildings are zero; and
- Design measures to achieve a target of "Very Good" under BREEAM including measures to minimise embodied carbon of materials used.

Step 2b: Robustness, timeliness and efficacy of mitigation

14.7.49 The principles of the IEMA Guidance are that where GHGs cannot be avoided, that mitigation should be provided to minimise GHGs. Mitigation measures adopted by the Development are described for each element of the GHG footprint.

14.7.50 Mitigation measures adopted equally by the Eastern and Western Developments are described for each element of the GHG footprint.

Construction

14.7.51 Mitigation measures adopted by the Eastern and Western Developments to minimise GHG emissions from the construction and enabling phase are inherent in the design and described in Section 14.5. No additional measures are proposed.

Operation

Transport

14.7.52 A Framework Travel Plan (FTP) accompanies the planning application. This describes the short and long-term strategies which will be implemented to encourage sustainable travel and to reduce reliance on private car use. The FTP has set an initial target to reduce mode share for employee car use by 10% during the first five years of the development. The objectives of the plan are:

- To reduce the number of car trips per unit / dwelling per day;
- To increase membership and participation in a car share scheme;
- To increase employee membership to the local bicycle user group (BUG);
- To increase walking and cycle use;
- To increase the take up and renewal of public transport passes; and
- To increase awareness of benefits of sustainable travel.

14.7.53 To meet these objectives the FTP sets out a number of measures that will be facilitated by the appointment of a Travel Plan Co-ordinator (TPC) as follows;

Measures to Encourage Walking

- Footway connections to local facilities including A3/A5 outlets at Baynards Green Services;

- Secure changing and shower facilities will be provided within each unit;
- Demand for facilities will be monitored through the staff travel survey and new facilities provided as necessary;
- Information and advice concerning safe pedestrian routes to the site will be available to employees;
- The TPC will explore the potential for improvements to off-site facilities and liaise with the planning authority when necessary;
- The TPC will raise awareness of the health benefits of walking through promotional material; and
- Maps providing safe walking routes indicating distances and times to the most common destinations near to the work place (such as local bus stops).

Measures to Encourage Cycling

- A dedicated cycle route to Bicester;
- Sheltered and secure cycle parking will be located within each unit;
- Information and advice concerning safe cycle routes to the site will be available to employees;
- The TPC will try to negotiate discounts from cycle shops for staff to purchases a bicycle, the necessary safety equipment and waterproof clothing to enable them to commute to work by cycle;
- The TPC will investigate the initiation of a Bicycle User Group (BUG) to support staff that commute by cycle and to encourage others to do so;
- The TPC will establish contacts with the cycling officers of OCC to ensure input to the further development of any existing cycling strategy in the vicinity of the proposed development; and
- The TPC will ensure that the cycle stores and changing facilities that are in place are adequate and maintained.

Measures to Encourage the Use of Public Transport

- Details of relevant bus services will be prominently displayed for the information of employees;
- The TPC will liaise with the bus service operators to ensure that up-to-date timetable and route information is displayed;
- The TPC will contact local bus operators to find out whether discounted ticketing initiatives are available; and
- The TPC will seek to encourage the use of public transport.

Measures to Encourage Car Sharing

- The use of Oxfordshire's car sharing database (link: https://oxfordshire.liftshare.com/) will be promoted to employees;
- Car sharers may be given preferential treatment for parking;
- Employers will be encouraged to provide a guaranteed lift home service in emergencies for car sharers; and

- A guaranteed lift home service could be extended to cater for 'emergency' or 'short notice' situations for staff that cycle or walk to the development site.

Energy Consumption

14.7.54 Key mitigation measures adopted by the Eastern and Western Developments to minimise GHG emissions from energy consumption are inherent in the design and described in Section 14.5. No additional measures are proposed.

Mitigation Summary

14.7.55 Table 14-16 sets out an assessment of the Development's approach to mitigation against the mitigation principles described in IEMA Guidance, to avoid and reduce GHGs where practicable and compensate for any residual emissions.

Table 14-16: Proposed Approach to Mitigation in Accordance with IEMA Mitigation Principles

Development Phase	Avoid and Reduce GHGs
Enabling and Construction	Good and best practice approach adopted to minimise materials with high embodied carbon. Best practice measures to minimise GHGs from construction activities and adoption of best practice performance standards and guidelines for construction e.g. BREEAM "Very Good" rating Implementation of CEMPs which will include measures to minimise construction journeys.
Operation – Transport	Implementation of Travel Plan with best practice measures to promote use of sustainable transport modes. Installation of on-site EV charging for cars and HGVs Bus stop on site to promote use of public transport.
Operation – Energy	Energy efficiency design measures and on adoption of renewable technologies including PV and ASHPs resulting in zero energy emissions for office and core areas of buildings.

Summary of GHG Assessment

14.7.56 The assessment of significance has followed a 2-step process consistent with IEMA Guidance and is summarised below in Table 14-17.

Table 14-17: Assessment of Significance

Step	Description	Assessment	Applicable IEMA rating
Step 1	Context	The Development's operational net emissions are a small component of local (0.9%) and national carbon budgets (0.03%).	N/A
Step 2	Consistency with National and Local policy	The Development includes primary design measures and further operational measures that are consistent with national and local policies to decarbonise emissions to net zero.	The Development is *"fully consistent with applicable existing and*

Step	Description	Assessment	Applicable IEMA rating
			emerging policy requirements"
	Robustness, timeliness and efficacy of mitigation	The Development has adopted good practice measures to avoid and minimise GHG emissions during the construction phase and over the lifetime of its operation.	The Development is *"in line with good practice design standards for projects of this type."*

14.7.57 Based on Table 14-17 and with reference to IEMA's significance criteria (see Table 14-1) the assessment therefore finds that the effects are *"fully in line with measures necessary to achieve the UK's trajectory towards net zero"* and are therefore assessed as minor adverse and not significant.

Residual Effects

14.7.58 No additional measures are proposed and therefore the residual effects remain as minor adverse and not significant.

Part B: Resilience to Climate Change

14.8 Assessment Methodology

14.8.1 This part of the chapter provides a qualitative assessment of the embedded mitigation and resilience of the Development to climate change. The assessment methodology takes into account the recommendations in the IEMA EIA guide to Climate Change Resilience and Adaptation[20] and has been adapted to ensure the assessment is proportionate to the Development.

Study Area and Scope

Geographical Scope

14.8.2 The study area for climate resilience, unlike other disciplines, focuses on the impact that climate will have on the Development (as opposed to the impact of the Development on the environment). The study area is therefore the footprint of the Development, split into its constituent parts (receptors).

Temporal Scope

14.8.3 The Development is envisaged to have a lifespan of 60 years. Climate projections from UKCP18 for the 2080s have been used (Representative Concentration Pathway (RCP) 8.5 - high emissions scenario). This is the latest time horizon for which UKCP Projections are available and consistent with IEMA (2020) Guidance[20].

Establishing Baseline Conditions

14.8.4 The assessment of resilience of the Development to the impacts of climate change was informed by regional scale information on historic and projected change in climate variables, and other studies undertaken relevant to the Development.

14.8.5 The future baseline conditions were defined by potential climate risks identified in the UK Climate Change Risk Assessment (2022)[24], National Adaptation Programme[23], and the Key Climate Projections: Headline Findings produced by the Met Office UK (2019)[22]. These are based on the 2018 UK climate projection dataset (UKCP18)[21].

Identifying Likely Significant Effects

14.8.6 It is standard practice in EIA to distinguish between construction and operational effects of the Development on the environment. However, the Resilience to Climate Change assessment is required to establish any significant effects of climate change on the Development. The focus of the assessment is therefore in the future when it is anticipated that changes from the existing climate will have occurred and these may pose risks in relation to the operational function of the Development and its users. As such, this part of the assessment does not explicitly consider climate risks during the construction period since these works will largely be happening in a period which is not subject to additional climate change to that already experienced and those risks are well established and managed through standard practices.

14.8.7 In terms of mitigation for climate change, this is principally a function of the design which needs to anticipate future risks and build in appropriate adaptation measures as required.

There is therefore an important focus on embedded measures to address future climate change.

14.8.8 The assessment starts by establishing potential receptors, potential climate risks and considers the significance of that risk through an assessment of likelihood and consequence taking into account embedded design measures.

14.8.9 As a further step the assessment identifies additional mitigation as required to address any significant effects and concludes on the residual risks.

14.8.10 Following IEMA Guidance[20], the assessment is carried out over five-steps, as follows:

Step 1: Establish Relevant Local and Regional Policy Requirements

14.8.11 This step establishes any relevant policy that informs the assessment of climate risks, and requirement for measures to manage those risks (knowns as adaptation measures).

Step 2: Identify Receptors

14.8.12 During this stage, relevant receptors in the Development which may be affected by climate change (e.g., change in average weather conditions and extreme events) are identified.

Step 3: Identify Potential Impacts of Climate Change on Receptors and Confirm Embedded Mitigation

14.8.13 This stage comprises identification of potential impacts of changes in a range of climate variables on the receptors identified in Step 2. This is undertaken using professional judgement and identifies the design measures to mitigate the impacts taking into account policy requirements identified in Step 1.

Step 4: Assess the Significance of Effects of Climate Change on Receptors

14.8.14 This step assesses the significance of each hazard (using definitions in Table 14-18) based on scoring the likely consequence and likelihood of that hazard arising, using a five-point scale described in Table 14-19 and Table 14-20. The assessment of significance and scoring of likelihood and consequence are based on IEMA Guidance[20].

Table 14-18: Qualitative Description of Consequence

Measure of Consequence	Description
Negligible	No damage to the Development, minimal adverse effects on health, safety and the environment or financial loss. Little change to service and disruption lasting less than one day.
Minor Adverse	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.
Moderate Adverse	Limited damage and loss of service with damage recoverable by maintenance or minor repair. Disruption lasting more than one day but less than one week. Moderate financial losses. Adverse effects on health or the environment.

Measure of Consequence	Description
Large Adverse	Extensive damage and severe loss of service. Disruption lasting more than one week. Early renewal of 50-90% of the Development. Permanent physical injuries and/or fatalities. Major financial loss. Significant effect on the environment, requiring remediation.
Very Large Adverse	Permanent damage and complete loss of service. Disruption lasting more than one week. Early renewal of the Development >90%. Severe health effects or fatalities. Extreme financial loss. Very significant loss to the environment requiring remediation and restoration.

Table 14-19: Qualitative Description of Likelihood

Measure of Likelihood	Description (assuming 60-year lifetime)
Very High	The event occurs multiple times during the lifetime of the Development e.g., approximately annually.
High	The event occurs several times during the lifetime of the Development e.g. approximately once every five years.
Medium	The event occurs limited times during the lifetime of the Development e.g. approximately once every 15 years.
Low	The event occurs occasionally during the lifetime of the Development e.g. once in 60 years.
Very Low	The event may occur once during the lifetime of the Development.

14.8.15 These determinants are combined to assess the significance of effects on receptors, as shown in Table 14-20. The assessment is qualitative and based on expert judgment based on knowledge of similar schemes, engagement with the wider Project Team and a review of relevant literature.

14.8.16 The assessment of significance takes embedded mitigation into account. Embedded mitigation is identified through consultation with the Project Team and taking into account policy requirements identified through Step 1.

Table 14-20: Significance Rating Matrix

Likelihood of hazard occurring	Consequence of Hazard Occurring				
	Negligible	Minor Adverse	Moderate Adverse	Large Adverse	Very Large Adverse
Very High	Not significant	Significant	Significant	Significant	Significant
High	Not significant	Significant	Significant	Significant	Significant
Medium	Not significant	Not significant	Significant	Significant	Significant
Low	Not significant	Not significant	Not significant	Significant	Significant
Very Low	Not significant	Not significant	Not significant	Not Significant	Not Significant

Step 5: Establish Further Adaptation Measures and Determine Residual Effects

14.8.17 In the fifth step, further adaptation and mitigation measures for any significant effects are identified through expert opinion based on knowledge of similar schemes and consultation with the project team and any residual effects of climate change on the receptors are assessed using Table 14-18 to Table 14-20.

Assumptions and Limitations

14.8.18 This assessment provides a broad indication of the potential impacts of climate change on the Development based on a qualitative assessment and professional judgement using knowledge of similar schemes. The UKCP18 projections are the most up-to-date projections of climate change for the UK.

14.8.19 UKCP18 provides probabilistic projections of future climate for a range of emissions scenarios. Future GHGs emissions, and resulting pathway, is uncertain. A precautionary approach, consistent with IEMA Guidance[20] has therefore been adopted by selecting a high emissions scenario (RCP8.5) and long-term time slice (2080s) which offer the longest-term projections into the project timescale.

14.8.20 The embedded adaptation measures are based on information provided by the Design Team. The determination of significance has been undertaken under the assumption that industry design standards will be adhered to where detailed design information is unavailable.

14.9 Baseline Conditions

Existing Conditions

14.9.1 Table 14-21 sets out the current understanding of climate hazards within the Site based on Met Office published baseline data[30].

Table 14-21: Current Climate Change Hazards

Climate Hazard	Current Baseline
Extreme Rainfall and Flood Risk	The Met office climate data for 12km square located at the Site states there have been 9 rainy days on average per month (in the summer) and 10 days in the Winter over the period 1991-2019, with a wettest summer day in the past 30 years resulting in 45mm of rain, and 32mm in the Winter.
Storms and Drought	The Met office confirms that although severe storms will occur more frequently with climate change, drought conditions are also expected to increase as summers become drier and hotter. The South East is already classed as 'seriously water stressed', meaning more water is taken from the natural environment than is sustainable in the long-term.
Extreme Temperatures	The Met office climate data[4] for the 12km square located at the site states that the hottest summer day in the past 30 years (1991 to 2019) was 35.9C (and

[4] This data excludes data relating to the record heatwave that was experienced in July 2022

Climate Hazard	Current Baseline
	winter day of 18.7C), with 4 days during the summer where the temperatures was above 25C per month on average.

14.9.2 There has been a significant human influence on the observed warming in the UK annual temperature since 1950. Statistical results from extreme value analysis suggest that the UK daily maximum and minimum temperature extremes have increased by just over 1°C since the 1950s, and that heavy seasonal and annual rainfall events have also increased.

14.10 Future Baseline

14.10.1 Climate modelling completed by the meteorological office (UKCP18) forecasts drier hotter summers, warmer wetter winters and more frequent extreme weather events due to climate change.

14.10.2 At the same time, there are upward trends in rainfall across the UK. Higher levels of winter rainfall have been experienced with increasingly heavy rainfall events leading to more flooding and damage to buildings and infrastructure. These patterns are consistent with projections of more, and heavier, rainfall for the UK in a warmer global atmosphere. These changes increase health and safety risks to people and the built environment, increasing costs and disruption for repair and adaptation.

14.10.3 Four key climate risks are identified for the Proposed Development, as follows:

- hotter summers with extreme temperatures (heatwaves);
- wetter winters including extreme rainfall;
- drier summers including drought; and
- increased wind and storms, which are considered in this assessment.

14.10.4 Information on predicted UK climate is taken from the UK Climate Projections (UKCP18)[22] specific to the UK region for the Proposed Development. UKCP18 are the most up-to-date projections of climate change for the UK. The projections include probabilistic projections of a range of climate variables for different emissions scenarios, known as RCPs, over a range of time slices. These are summarised in Table 14-22.

Table 14-22: Climate Projections for East of England using UKCP18 - RCP8.5 (50th percentile)

Climate Variable [a]	2070/80s
Mean annual temperature	+3.7 °C
Mean winter temperature	+2.9°C
Mean summer temperature	+4.9 °C
Mean winter precipitation (%)	+24 %
Mean summer precipitation (%)	-33 %

[a] Change relative to 1981-2000 baseline

14.10.5 UKCP18 data shows that future climatic conditions at the Site have the potential to be substantially warmer in both summer and winter, wetter in the winter than current day, but much drier in the summer. Key climate risks therefore relate to heavy winter rainfall, droughts and heatwaves in summer and extreme weather events (winds and storms).

Snow

14.10.6 According to UKCP18 projections, for the period 2061-2080, under a high emissions scenario (RCP8.5), the regional (12km) and local (2.2km) projections show a decrease in both falling and lying snow across the UK relative to the 1981-2000 baseline. For this assessment snow is not considered to be a climate hazard.

Wind

14.10.7 There are no compelling trends in storminess, as determined by maximum gust speeds, from the UK wind network over the last four decades. UKCP18 projections over the UK show an increase in near surface wind speeds over the UK for the second half of the 21st century for the winter season when more significant effects of wind are experienced. This is accompanied by an increase in frequency of winter storms over the UK. However, the increase in wind speeds is modest compared to inter-annual variability.

14.11 Assessment of Climate Resilience

14.11.1 The assessment has followed the 5-step process identified earlier. The assessment under each step is detailed further below.

Step 1: Establish Relevant Local Policy Requirements

14.11.2 Policy ESD 1: Mitigating and Adapting to Climate Change of the Local Plan states that:

"The incorporation of suitable adaptation measures in new development to ensure that development is more resilient to climate change impacts will include consideration of the following:

- *Taking into account the known physical and environmental constraints when identifying locations for development*
- *Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling*
- *Minimising the risk of flooding and making use of sustainable drainage methods, and*
- *Reducing the effects of development on the microclimate (through the provision of green infrastructure including open space and water, planting, and green roofs).*

Adaptation through design approaches will be considered in more locally specific detail in the Sustainable Buildings in Cherwell Supplementary Planning Document (SPD).

14.11.3 Nationally the NPPF sets out policy on climate resilience. Paragraph 158 states that Local Planning Authorities:

"Should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure"

Step 2: Identify Receptors

14.11.4 The key receptors on-site identified are:

- Buildings and occupiers; and
- Landscaping and biodiversity.

Step 3: Identify Potential Impacts of Climate Change on Receptors and Embedded Mitigation

14.11.5 A number of potential impacts were identified. The Project Team were consulted regarding the potential risks inherent to the Development's design. The results are detailed in Table 14-23.

Table 14-23: Climate Risks and Mitigation

Climate Variable	Receptor	Potential Impact	Design Measures to Mitigate Impacts
Hotter Summers Extreme Temperatures (Heatwaves)	Buildings and occupiers	Overheating	▪ Overheating analysis to be undertaken in accordance with CIBSE TM59 utilising dynamic modelling. ▪ Mechanical ventilation and cooling to be provided as required. ▪ Specify efficient equipment and lighting that reduce internal heat gains ▪ Solar shading to be incorporated to glazed elements identified as at risk due to building orientation. ▪ Ability to incorporate natural ventilation within the glazing through openable windows.
		Fire	▪ The Development design adheres with relevant standards and guidance on fire prevention.
Wetter Winters Extreme Rainfall	Buildings and occupiers	Flooding	▪ Findings of Flood Risk Assessment (FRA) to be addressed within the site drainage design. ▪ On-site attenuation to be designed sufficiently for the measured management of surface water

Climate Variable	Receptor	Potential Impact	Design Measures to Mitigate Impacts
			generated on-site. Specifically, the surface water run-off from the development will be managed within the planning boundary for rainfall events up to and including the 1 in 100 year plus 40% Climate Change allowance return period. ▪ Design includes soft landscaping, permeable paving and appropriate attenuation.
	Landscaping and biodiversity	Damage to landscaping by surface water flooding	▪ Ensure material within landscaping design is suitably retained to avoid wash off into water courses (potential blocking risk)
Drier Summers Drought	Buildings and occupiers	Lack of water	▪ Specification of low flow rate sanitary appliances ▪ Rainwater harvesting to be included as part of the design. To be used for grey water and irrigation.
	Landscaping and Biodiversity	Loss of site planting and biodiversity due to drought	▪ Planting specifications to take in to account potential for drought.
Wind, storms and snow	Buildings and occupiers	Storm damage to roofs and facades	▪ Structural design to consider wind loading and up lift pressure on cladding materials. ▪ No roof plant proposed, only PV panel array ▪ Proximity of external structures sufficiently distanced to avoid impact should these be toppled under storm conditions. ▪ Roof lights designed to withstand standing snow.
	Landscaping and biodiversity	Soil erosion, damage to trees and planting and loss of biodiversity.	▪ Tree, shrub and hedge planting to be planned to avoid wind damage.
Subsidence and ground movement	Buildings and occupiers	Structural damage to	▪ Survey to be undertaken for the site to determine the risks specific to the site.

Climate Variable	Receptor	Potential Impact	Design Measures to Mitigate Impacts
		buildings and services	▪ Structure designed in accordance with Site Investigation. Design includes for movement within the foundations and structure to limit relative settlements between adjacent foundations. ▪ Inclusion of movement joints, sliding connections and spanning details where required by site specific ground conditions.

Step 4: Assess the Significance of Effects of Climate Change on Receptors

14.11.6 Table 14-24 details the assessment of climate risks identified in Step 2 above, taking into account design measures to mitigate risks.

Table 14-24: Climate Resilience Assessment

Climate Variable	Receptor	Potential Impact	Likelihood	Consequence	Risk
Hotter Summers Extreme Temperatures (Heatwaves)	Buildings and occupiers	Overheating	Medium	Minor Adverse	Not significant
		Fire	Very Low	Large Adverse	Not significant
Wetter Winters Extreme Rainfall	Buildings and occupiers	Fluvial flooding	Medium	Minor Adverse	Not Significant
	Landscaping and biodiversity	Damage to landscaping by surface water flooding	Medium	Minor Adverse	Not significant
Drier Summers Drought	Buildings and occupiers	Lack of water	Very Low	Minor Adverse	Not significant
	Landscaping and Biodiversity	Loss of site planting and biodiversity due to drought	Medium	Minor Adverse	Not significant
Wind, storms and snow	Buildings and occupiers	Storm damage to roofs and facades	Low	Moderate Adverse	Not significant
	Landscaping and biodiversity	Soil erosion, damage to trees and planting and loss of biodiversity.	Medium	Minor Adverse	Not significant

Climate Variable	Receptor	Potential Impact	Likelihood	Consequence	Risk
Subsidence and ground movement	Buildings and occupiers	Structural damage to buildings and services	Very Low	Large Adverse	Not significant

Step 5 Establish Further Adaptation Measures and Determine Residual Effects

14.11.7 Table 14-24 shows that there are no significant effects on the Development due to future climate change.

Residual Effects

14.11.8 The residual effects are in line with those described in Table 14-24 and are not significant

14.12 Cumulative Resilience Effects

14.12.1 All cumulative developments as outlined with Appendix 3.4 of Chapter 3: EIA Methodology have been considered in the identification of cumulative effects from climate change.

14.12.2 The climate resilience assessment considers the impacts of climate change on the Development and as such, the receptors for the assessment are the Development and its users. The changes in climate variables described in the baseline section will be experienced by all developments in the vicinity of the Development. However, the potential impacts from climate change may alter as a result of cumulative developments.

14.12.3 Effects associated with flooding and surface water runoff as a result of higher winter rainfall and extreme rainfall events may be exacerbated by cumulative developments which increase the impermeable area in the vicinity of the Development. However, the Flood Risk Assessment, to the extent this is relevant takes account of climate change and cumulative effects so this is not further assessed here.

14.12.4 Effects associated with higher summer temperatures and more extreme temperature events could be exacerbated by cumulative developments if they result in a large increase in hard surface in the vicinity of the Development (urban heat island effect). However, the Development is not in an urbanised region.

14.12.5 Cumulative effects with respect to climate resilience are therefore not significant.

14.13 Conclusions

14.13.1 The climate resilience measures identified and adopted by the design seek to minimise climate risks due to future climate change.

14.13.2 The assessment has found that the Development is resilient to likely climatic changes within its lifetime and the effects are not significant.

14.13.3 Table 14-25 below provides a summary of the GHG and climate resilience residual effects.

Table 14-25: Summary of Residual Effects

Effect	Receptor (Sensitivity)	Geographic Scale	Temporal Scale	Magnitude of Impact		Mitigation and Monitoring		Residual Effect	
Enabling Works, Construction and Completed Development									
Whole life GHG emissions	Not applicable	Global	Permanent	Enabling Works	Minor adverse	Enabling Works	Adherence to the CEMP 'BREEAM Very Good, with aspirations/capabilities to achieve Excellent Travel Plan Energy efficient design Full offset of office and core areas building energy requirements (zero carbon) through PV cells	Enabling Works	Minor adverse
				Eastern Development		Eastern Development		Eastern Development	
				Western Development		Western Development		Western Development	
				Development		Development		Development	
Resilience to climate change	Not applicable	Development site	Permanent	Enabling Works	Not significant	Enabling Works	Design measures to adapt to future climate change risks	Enabling Works	Not significant
				Eastern Development		Eastern Development		Eastern Development	
				Western Development		Western Development		Western Development	
				Development		Development		Development	
Cumulative Effects									
Whole life GHG emissions	Not applicable	Global	Permanent	Minor adverse		as above		Minor Adverse	
Resilience to climate change	Not applicable	Development site	Permanent	Not significant		as above		Not significant	

References

[1] Her Majesty's Stationery Office, 2008. Climate Change Act 2008.

[2] Her Majesty's Stationery Office, 2019. The Climate Change Act 2008 (2050 Target Amendment) Order 2019

[3] UK Government, (2017). The Town and Country Planning (Environmental Impact Assessment) Regulations (2017), [online]. Available at: https://www.legislation.gov.uk/uksi/2017/571/pdfs/uksi_20170571_en.pdf. Accessed: August 2021.

[4] HMSO, (2018). The Town and Country Planning and Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2018. The Stationary Office. October 2018.

[5] Department for Communities and Local Government, (2023). National Planning Policy Framework. December 2023.

[6] Cherwell District Council, 2016. The Cherwell Local Plan 2011 – 2031, Part 1. Adopted 20 July 2015 (incorporating Policy Bicester 13 re-adopted on 19 December 2016) - see file:///C:/Users/graham/Downloads/Final_adopted_Local_Plan_2011_2031_incorprating_re_adopted_policy_Bicester_13.pdf Accessed 11/8/2021

[7] IEMA, (2022). Assessing Greenhouse Gas Emissions and Evaluating their Significance. 2nd Edition.

[8] The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard, World Resource Institute, Revised Edition (2001)

[9] Publicly Available Standard (PAS) 2080: 2023 Carbon Management in Buildings and Infrastructure, published 30th April 2023. BSI.

[10] CCC (2019). Net Zero, Technical report.

[11] CCC (2021), Sixth Carbon Budget: https://www.theccc.org.uk/publication/sixth-carbon-budget/

[12] HM Government (2021). Net Zero Strategy: Build Back Greener

[13] HM Government (2023). Carbon Budget Delivery Plan

[14] RICS (2017) Whole life carbon assessment for the built environment, 1st edition.

[15] RICS, (2023). Whole life carbon assessment for the built environment. 2nd edition.

[16] EN15978 (2011) - Sustainability of construction works. Assessment of environmental performance of buildings. Calculation method

[17] CDC. 2020 Climate Action Framework, Transforming Cherwell, Appendix 1. See https://www.cherwell.gov.uk/download/downloads/id/9828/climate-action-framework-2020.pdf Accessed 23/08/21

[18] See https://www.cherwell.gov.uk/info/7/environment/752/climate-emergency, Accessed /8/2021

[19] See https://www.cherwell.gov.uk/download/downloads/id/9871/greenhouse-gas-report-2019-2020.pdf

[20] IEMA, (2020). Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation

[21] Met Office UK, (2018). UK Climate Projections.

[22] Met Office UK, (2022). UK Climate Projections: Headline Findings.

[23] Department for Environment, Food & Rural Affairs (Defra), (2018). The National Adaptation Programme (NAP) and the Third Strategy for Climate Adaptation Reporting

[24] Her Majesty's Government, (2022). UK Climate Change Risk Assessment 2022.

[25] DESNZ (2023) UK Government GHG Conversion Factors for Company Reporting

[26] CIBSE Guide F, Table 20.19(b) for Equipment

[27] DESNZ (2023) Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal (used for electricity consumption).

[28] CIBSE Guide F, Table 20.19(b) for Equipment

[29] University of Manchester Tyndall Centre for Climate Change Research, (2023) The Tyndall Carbon Budget Tool. Setting Climate Commitments.

[30] See https://www.bbc.co.uk/news/resources/idt-d6338d9f-8789-4bc2-b6d7-3691c0e7d138