

7 Climate Change and Greenhouse Gases

7.1 Introduction

- 7.1.1 This chapter of the Environmental Statement (ES) has been prepared by AES Sustainability Consultants on behalf of the Applicant, Crest Nicholson Operations Ltd, in respect of the Proposed Development at Former Arborfield Studios (Parcels W, Y and Z), Arborfield Green ('the Site'). It assesses the potential effects on and due to climate change. The assessment considers both the contribution of the development to climate change, through greenhouse gas (GHG) emissions, and the vulnerability of the development to future climate change impacts and scenarios. In doing so, it addresses mitigation and adaptation, in accordance with relevant legislative, policy, and guidance requirements.
- 7.1.2 The climate change assessment has been undertaken in line with the EIA Regulations, national planning policy, and relevant best-practice guidance. Under The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, applicants are required to include in the ES where relevant to the development "a description of the likely significant effects of the development resulting from, inter alia: [...] the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change" (Schedule 4, paragraph 5(f)).
- 7.1.3 This assessment therefore examines three interlinked themes:
- GHG emissions arising directly and indirectly from construction and operation, and their contribution to anthropogenic climate change;
 - The exposure of the completed development to climate-related hazards over its operational lifetime, together with measures to manage these risks; and
 - How changing climatic conditions might alter the way other environmental effects manifest or affect sensitive receptors.
- 7.1.4 This Chapter evaluates the likely significant effects both on and due to climate change, associated with the construction and operational phases of the development, including embodied and operational carbon emissions, and considers opportunities to avoid, reduce, and mitigate emissions through design, material selection, construction practices, and operational efficiencies.
- 7.1.5 In addition, this chapter considers the resilience of the Proposed Development to projected changes in climate conditions over its lifetime. This includes an assessment of potential climate-related risks, such as increased temperatures, changes in precipitation patterns, and the frequency or intensity of extreme weather events, and the incorporation of appropriate adaptation measures to ensure the development remains safe, functional, and sustainable in a changing climate.
- 7.1.6 The assessment draws on published climate projections, established carbon assessment methodologies, desk-based analysis and professional judgement. Mitigation and adaptation measures embedded within the project design are identified, and any residual effects are described. The findings of this chapter provide an evidence base to demonstrate how climate change considerations have been integrated into the Proposed Development and to support informed decision-making. Additional details of the climate projections, methodology and data supporting the assessment of climate change related risks are included in Appendix 7.2

(Climate Projections and Risk Assessment); the calculations of GHG emissions are set out in full within this chapter

7.2 Assessment methodology

Legislation and Policy Framework

- 7.2.1 The assessment of GHG emissions draws upon the framework of international commitments, national legislation, and local planning policy that collectively define the UK's approach to decarbonisation. These instruments establish both the targets against which emissions can be contextualised and the policy mechanisms intended to drive reductions across all sectors of the economy.

International Framework

- 7.2.2 The foundation for international climate action was established through the Kyoto Protocol, which created binding emission reduction commitments for developed nations. This agreement identified seven gases of concern - carbon dioxide, methane, nitrous oxide, nitrogen trifluoride, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride - which together comprise the standard 'basket' of greenhouse gases addressed in emissions accounting.
- 7.2.3 Building upon this foundation, the Paris Agreement of 2015 established the objective of constraining global average temperature rise to well below 2°C above pre-industrial levels, with efforts to limit warming to 1.5°C. Parties to the agreement submit Nationally Determined Contributions (NDCs) setting out their planned emission reductions. The UK's current NDC commits to reducing emissions by at least 68% below 1990 levels by 2030, with a further commitment announced at COP29 in November 2024 targeting an 81% reduction by 2035

UK Climate Legislation

- 7.2.4 Domestic implementation of these international commitments is anchored in the Climate Change Act 2008, amended in 2019 to establish a legally binding target of net zero emissions by 2050. The Act requires the setting of five-yearly carbon budgets that define a declining trajectory of permitted emissions. The current budgets establish limits of 1,950 MtCO₂e for the Fourth Budget period (2023-2027), 1,725 MtCO₂e for the Fifth (2028-2032), and 965 MtCO₂e for the Sixth (2033-2037). The Seventh Carbon Budget, covering 2038-2042, was set in law in June 2026 at 535 MtCO₂e, corresponding to a reduction of approximately 87% against 1990 levels.
- 7.2.5 The Climate Change Act also created the Climate Change Committee (CCC), an independent statutory body charged with advising government on carbon budgets and monitoring progress toward their achievement. The CCC's most recent progress report highlights that while emissions continue to fall, the pace of reduction must accelerate substantially to meet the Sixth Carbon Budget and subsequent net zero target. Key recommendations emphasise the rapid deployment of heat pumps, improved building energy performance, and accelerated electrification of transport
- 7.2.6 Government policy responses include the Net Zero Strategy, the Heat and Buildings Strategy, and successive updates to Building Regulations. The recently announced Future Homes Standard, coming into force in 2027, will require new dwellings to produce significantly lower carbon emissions through improved fabric performance and low-carbon heating systems, effectively mandating 'zero carbon ready' construction that will achieve net zero operation as the electricity grid decarbonises.

- 7.2.7 The Climate Change Act 2008 also provides the statutory framework for adaptation. Under section 56 of the Act, the Government publishes a five-yearly UK Climate Change Risk Assessment, most recently in 2022 (CCRA3), informed by the Climate Change Committee's independent assessment of UK climate risk. The priority risks identified of most relevance to the Proposed Development are risks to human health, wellbeing and productivity from increased exposure to heat in homes and other buildings, and risks to communities and the built environment from flooding.
- 7.2.8 The Government's response to these risks is set out in the Third National Adaptation Programme (NAP3, 2023) under section 58 of the Act, which identifies high temperatures, changes to air quality and flooding as the principal climate risks to health, communities and the built environment. Together these instruments form the policy context for the climate change resilience strand of this assessment.

National Planning Policy

- 7.2.9 The National Planning Policy Framework (NPPF) sets out the government policies for plan-making and for making decisions on development proposals in England. In August 2026, the Ministry for Housing, Communities and Local Government (MHCLG) published a new NPPF to replace the previous version (December 2024) with immediate effect.
- 7.2.10 Chapter 5 of the 2026 NPPF – Meeting the challenge of climate change – includes guidance which is particularly relevant to the proposed energy performance and climate resilience of this development.
- 7.2.11 The objective of the policies in this chapter is to support the transition to net zero by 2050 and to shape places in ways which are more resilient to the effects of climate change.
- 7.2.12 It does this by setting out policies to shape places in ways that contribute to radical reductions in greenhouse gas emissions and adapt to the full range of current and potential impacts of climate change, by minimising vulnerability and improving resilience.
- 7.2.13 Policy CC3: Planning for Climate Change states that development plans should take a proactive approach to mitigating climate change and supporting the transition to net zero, in accordance with the objectives and provisions of the Climate Change Act 2008. They should also take a proactive approach to adapting to climate change, taking into account the implications of extreme weather and long-term climate trends including overheating, wildfires, drought, flood risk, coastal change, water supply, biodiversity and landscapes.
1. They should do this by: They should do this by:
- a. Proposing development patterns through their spatial strategy and allocations which
 - i) Can help contribute to radical reductions in greenhouse gas emissions (which can be informed by an assessment of baseline carbon emissions and the potential effect of development options on future emissions and their mitigation); and
 - ii) Avoid increased vulnerability and improve resilience to the effects of climate change.
 - b. Addressing any specific risks from climate change in their proposed allocations for development, and necessary adaptations, both of which should be considered for the anticipated lifetime of the development.
 - c. Setting local water efficiency standards for new developments where these are justified

- d. Identifying opportunities for green infrastructure provision and nature based solutions which can safeguard and improve carbon storage, support nature recovery and resilience, and which take account of Local Nature Recovery Strategies.
- 7.2.14 Policy CC2: Mitigation of Climate Change states that in order to contribute to climate change mitigation and the transition to net zero, development proposals should where relevant to the proposal.
- a. Accord with policies TR3 and TR4 [*Promoting sustainable transport*] so that sustainable patterns of movement are prioritised, and infrastructure is provided to support the transition to zero emission vehicles;
 - b. Support good access to facilities in order to limit the need to travel.
 - c. Use design approaches which conserve energy and other resources;
 - d. Take advantage of opportunities to re-use existing structures and materials;
 - e. Take advantage of opportunities to draw low carbon energy from decentralised networks (such as district heat networks), where these are available, and to co-locate energy and heat generators and users, especially to take advantage of suppliers of surplus heat and energy;
 - f. Contribute to the creation and restoration of habitats, while avoiding harm to habitats
 - g. Not involve the extraction of fossil fuels.
- 7.2.15 Section 2 of the NPPF, Plan-Making Policies – requires local planning authorities produce and maintain key documentation so the planning process allows residents to influence in how development and growth is prioritised in their area.
- 7.2.16 Required documents include spatial development strategies, a local plan, a policies map, and may also include supplementary and neighbourhood specific plans for future development.
- 7.2.17 Policy PM13 is relevant to this document, as locally written council policies are expect not to contradict nationally approved standards:
- 7.2.18 The Clean Growth Strategy (2017) first set out priorities relevant to planning for new residential development: improving the energy performance standard of new homes; making walking and cycling the “natural choice for shorter journeys”; requiring provision of electric vehicle charging points; and decarbonising heating. It has since been superseded, and these priorities are now carried through the Net Zero Strategy (2021), the Government’s subsequent carbon budget delivery plans, the Future Homes Standard and Building Regulations Parts L, S and O, and the current NPPF, as addressed elsewhere in this chapter.

Local Planning Context

- 7.2.19 Wokingham Borough Council (WBC) members unanimously declared a climate emergency in July 2019 and established a formal commitment to achieve carbon neutrality by 2030. Subsequently, the council published its first climate Emergency Action Plan.
- 7.2.20 Wokingham Borough Council Climate Emergency Strategy (September 2025) identifies actions which follow the energy hierarchy approach, a sustainability method that has been utilised by various governments and institutions to minimise emissions.

- 7.2.21 The strategy identifies nine priority areas for working towards a carbon neutral borough by 2030, including transport, renewable energy generation, retrofitting of existing buildings, carbon sequestration and the approach to new development.
- 7.2.22 The adopted Core Strategy (2010) includes a number of policies aimed at reducing the impacts of new development on the environment. These include:
- Policy CP1 requiring development to minimise emissions and contribute toward zero-carbon goals
 - Policy CP6 contains requirements to “provide for sustainable forms of transport to allow choice” and “not cause highway problems or lead to traffic related environmental problems”.
 - Policy CP7 reinforces the importance of development which retains and enhances local biodiversity.
- 7.2.23 The Managing Development Delivery Local Plan (2014) adds specific requirements including Policy CC04 which requires developments to deliver high quality, sustainably designed and constructed developments, and CC05 which mandates a minimum 10% carbon reduction through renewable energy for schemes exceeding 10 dwellings.
- 7.2.24 The MDD Local Plan also includes Policy CC09 (Development and Flood Risk), which requires development proposals to address flood risk from all sources taking account of climate change, and Policy CC10 (Sustainable Drainage), which requires the incorporation of sustainable drainage systems supported by a drainage strategy. Wokingham Borough Council's Climate Change Interim Policy Position Statement (2022) clarifies how the adopted policies are to be applied in the context of the Council's climate emergency declaration, pending adoption of the Local Plan Update.
- 7.2.25 Policy SS11 – Arborfield Green Strategic Development Location outlines the site-specific requirements for the wider Arborfield Green SDL, including the below extracts relating to sustainable development and reducing the impact on the local area:

4 b - Achieve climate resilient neighbourhoods through the application of adaptation and mitigation methods, including embedding passive design principles and energy demand reduction measures in the sustainable design and construction of buildings and homes

4 d - Locate new buildings outside areas of flood risk, with development planned for sequentially, by placing the most vulnerable development in the lowest areas of flood risk

7. Development proposals should devise and implement a comprehensive drainage and flood alleviation strategy that: a) Provides high quality sustainable drainage systems (SuDS) that are integrated into the wider landscape and green and blue infrastructure strategy, including mitigation at source and makes a positive contribution to attractive open spaces, and improvements to biodiversity and water quality; and b) Establishes clear and robust arrangements for future maintenance

Policy SS11 also requires a comprehensive ecological strategy achieving a measurable biodiversity net gain of at least 10% together with measures to protect the Thames Basin Heaths Special Protection Area, and a sustainable transport and movement strategy, informed by a detailed Transport Assessment, providing improved

public transport services and safe, convenient pedestrian and cycle connections through and beyond the SDL.

Emerging Local Plan

7.2.26 The emerging Local Plan Update (2023-2040) introduces a range of more stringent environmental policies.

7.2.27 Policy SS1: Sustainable development principles (climate-relevant extracts):

“1. As appropriate to their nature, development proposals will be expected to:

g) Reduce energy demand in line with the principles of the energy hierarchy, considering the orientation, layout and design of development to maximise passive heating and cooling systems opportunities and implement a fabric first approach to construction;

h) Respond to climate hazards, incorporating appropriate adaptation and resilience measures;

i) Avoid high risk flood areas, or where necessary provide appropriate mitigation measures;

7.2.28 Policy CE3 introduces more ambitious energy performance and carbon emissions standards. The policy seeks site average space heating demand of 15-20 kWh/m²/year and total energy demand averaging 35 kWh/m²/year for residential development, together with renewable energy generation to match energy consumption.

7.2.29 Policy CE5 requires whole life carbon assessment for developments of 50 or more dwellings, reflecting the growing recognition that embodied emissions from construction materials represent a substantial portion of a building's lifetime carbon footprint.

7.2.30 Policy C5 (Parking and Electric Vehicle Charging) requires electric vehicle charging provision within new development, with residential proposals of 10 or more dwellings required to submit an Electric Vehicle Charging Strategy. Policies FD1 (Development and Flood Risk) and FD2 (Sustainable Drainage) carry forward the requirements for site-specific flood risk assessment, allowance for climate change and sustainable drainage.

Building Regulations

7.2.31 Minimum standards for buildings are set by Approved Document L for Conservation of Fuel and Power (2021) Approved Document G (2013) for conservation of water, Approved Document F (2021) for Ventilation and Approved Document O (2021) for Overheating.

7.2.32 The Future Homes Standard was laid before Parliament on 24 March 2026 and comes into force on 24 March 2027, with transitional arrangements, and from 24 September 2027 for higher-risk buildings. Dwellings whose building regulations applications are made after 24 March 2027 will be required to comply with it; given a construction programme commencing in 2027 the Proposed Development is expected to be delivered substantially under the Future Homes Standard, and its energy strategy - air source heat pumps, no gas connections and photovoltaic generation - is consistent with that standard

7.2.33 The drive is for zero carbon ready dwellings through the decarbonisation of the grid, utilising highly efficient heat pump technology and on-plot renewable energy systems.

Guidance and Best Practice

7.2.34 The technical approach to this assessment draws primarily upon two publications from the Institute of Sustainability and Environmental Professionals (ISEP, formerly IEMA):

- ISEP (2026) 'Assessing Greenhouse Gas Emissions and Evaluating their Significance with Supplementary Guidance' (Edition 2.1, April 2026), comprising the February 2022 Second Edition guidance together with the 2026 supplementary guidance, applied as a whole; and
- IEMA (2020) 'EIA Guide to: Climate Change Resilience and Adaptation', June 2020.

7.2.35 Supplementary guidance used for the quantification of GHG emissions and climate risk assessment includes:

- the Greenhouse Gas Protocol suite of documents from the World Resources Institute and the World Business Council for Sustainable Development (WRI and WBCSD) (2004, and subsequent updates including the Corporate Value Chain (Scope 3) Standard, 2011)
- Valuation of Energy Use and Greenhouse Gas: Supplementary guidance to the HM Treasury Green Book from the Department for Energy Security and Net Zero (DESNZ, 2023)
- UK Government GHG Conversion Factors for Company Reporting (DESNZ and BEIS, 2024) and
- The UK Green Building Council (UKGBC) Framework for Measuring and Reporting of Climate-related Physical Risks to Built Assets (2022).

7.2.36 This chapter has been prepared in accordance with the April 2026 supplementary guidance published by ISEP as part of Edition 2.1. In line with that guidance: significance is evaluated separately for each lifecycle stage (construction and operation) as well as on a whole-life basis; comparisons of project emissions against carbon budgets are presented for context only and are not used as thresholds of significance; and mitigation is identified and applied through the refreshed GHG Management Hierarchy (Eliminate – Reduce – Substitute – Remove). The anticipated update to the 2020 climate change resilience guidance (expected late 2026) had not been published at the time of writing, and the June 2020 guide therefore remains the applicable guidance for the climate resilience strand of this assessment.

Predicting Effects

Sensitivity/value of receptors

7.2.37 The sensitivity or value of receptors has been defined with reference to relevant legislation, policy designations, professional guidance, and baseline conditions. Sensitivity reflects the importance of a receptor and its ability to accommodate change without adverse effect. For example, receptors subject to statutory protection or with high environmental, cultural, or community value are typically assigned higher sensitivity. Topic-specific definitions of receptor sensitivity are provided within each assessment chapter.

Magnitude of impact

7.2.38 The magnitude of impact describes the scale, extent, duration, frequency, and reversibility of change arising from the Proposed Development. Magnitude takes account of factors such as the geographical extent of the impact, the duration (temporary or permanent), and the likelihood of occurrence. Topic-specific criteria have been applied to ensure that the assessment of magnitude is proportionate and appropriate to the nature of each environmental topic.

Significance criteria

7.2.39 The significance of effects has been determined by combining the sensitivity or value of receptors with the magnitude of impact, using topic-specific significance matrixes or professional judgement, as appropriate. Significance criteria are applied consistently across the EIA to identify likely significant effects, as required by the EIA Regulations. Effects identified as significant are those considered to be material to the decision-making process.

7.2.40 Two distinct assessment frameworks are applied within this chapter, reflecting the different nature of the two strands of assessment. For GHG emissions, the receptor is the global atmosphere, which is of high sensitivity in all cases; no receptor-by-receptor magnitude matrix is therefore applied. Instead, the significance of GHG effects is evaluated using the five-level framework published in the ISEP guidance, judged against the compatibility of the Proposed Development with a 1.5°C-aligned, net zero trajectory (see 'Determining Significance' below). For climate change resilience – the effect of climate change on the Proposed Development – and for in-combination effects, a risk-based framework is applied: the likelihood of a climate hazard occurring over the development lifetime is combined with the consequence of that hazard to establish the magnitude of impact, and this is combined with the sensitivity of the receptor (reflecting its susceptibility, vulnerability and value) to determine the level of effect and its significance, using the matrices set out below together with the likelihood and consequence scales presented in Appendix 7.2.

Cumulative assessment methodology

7.2.41 The cumulative assessment methodology considers the combined effects of the Proposed Development in combination with other existing, approved, or reasonably foreseeable developments. A list of relevant developments has been agreed through consultation and review of planning records. Cumulative effects have been assessed on a topic-by-topic basis, with cross-topic interactions considered where relevant. The scope of the cumulative assessment is proportionate and reflects the potential for cumulative effects to arise, in line with ISEP guidance.

7.2.42 The assessment methodology stages, can be outlined as follows:

Table 7.1 Value/sensitivity assessment

Receptor value / sensitivity	Receptor type
High	Landscape and biodiversity
Medium	Site users and occupants
Low	Buildings and infrastructure
Negligible	Cultural heritage

7.2.43 Magnitude of impact, based on the change that the Proposed Development would have upon the resource/receptor, is considered within the range of high, medium, low, negligible. Consideration is given to scale, duration of impact/effect (e.g. for construction, short-term for 1-2 years, medium-term for 3-5 years, long-term for 5 years and greater, and permanent, dependent upon project timeframes) and extent of Proposed Development with reference to the definitions in the Table below.

Table 7.2 Magnitude of impact

Magnitude	Description
High	Severe or irreversible change to the receptor; loss of function, integrity or safety that cannot be managed through routine measures.
Medium	Partial or recurrent change to the receptor; function, integrity or wellbeing materially affected but recoverable through designed or managed measures.
Low	Measurable but minor and reversible change; function and integrity substantially maintained.
Negligible	Slight, barely perceptible change; no material effect on function, integrity or wellbeing.

7.2.44 For the climate change resilience strand, the magnitude of impact is derived from the likelihood of the climate hazard occurring over the relevant assessment period and the consequence of that hazard should it occur. Likelihood is assessed over the construction programme for construction phase risks and over the 60-year design life for operational phase risks. The scales applied are set out below, together with the matrix used to combine them; the evidence supporting each rating is presented in Appendix 7.2.

Table 7.3 Likelihood of climate hazard

Likelihood	Definition
High	The hazard is expected to occur repeatedly over the assessment period
Moderate	The hazard is expected to occur at least once over the assessment period
Low	The hazard may occur over the assessment period but is not expected to do so.
Rare	Occurrence over the assessment period is unlikely

Table 7.4 Consequence of climate hazard

Consequence	Definition
Major	Serious harm to health or life safety; loss of function of a building or asset for an extended period; damage requiring major repair or replacement
Moderate	Temporary harm to health or wellbeing; temporary loss of amenity or function; damage requiring repair

Consequence	Definition
Minor	Discomfort or inconvenience; localised, short-lived disruption; damage repairable within routine maintenance
Negligible	No discernible effect on health, function or amenity

Table 7.5 Magnitude of impact derived from likelihood and consequence

Likelihood	Consequence: Major	Consequence: Moderate	Consequence: Minor	Consequence: Negligible
High	High	High	Medium	Negligible
Moderate	High	Medium	Low	Negligible
Low	Medium	Low	Low	Negligible
Rare	Low	Low	Negligible	Negligible

7.2.45 The resulting magnitude of impact is then combined with the sensitivity of the receptor in the level of effect matrix below to determine the level of effect and its significance.

7.2.46 The predicted level of effect is based upon the consideration of magnitude of impact and sensitivity of the resource/receptor to come to a professional judgement of how important this effect is.

Table 7.6 Level of effect

Receptor Sensitivity	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Substantial	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

7.2.47 For climate risks, levels of effect of Moderate or above – that is, Moderate, Major or Substantial – are treated as significant and warrant designed mitigation; levels of effect of Minor or below are not significant. Each identified climate risk is reported in this chapter with its likelihood, consequence, magnitude of impact, receptor sensitivity, level of effect and significance, both prior to and following mitigation, and the evidence supporting each rating is set out in Appendix 7.2 alongside the scales applied. Levels of effect are qualified as adverse or beneficial according to the direction of the effect; all climate risks assessed in this chapter are adverse.

Approach to GHG Assessment

7.2.48 The assessment quantifies GHG emissions using published emission factors applied to projected activity data for the Proposed Development. Emissions are expressed as carbon dioxide equivalent (CO₂e) using 100-year global warming potentials, allowing different greenhouse gases to be reported on a common basis.

7.2.49 The assessment boundary encompasses:

- Embodied emissions from construction materials and processes (modules A1-A5 per BS EN 15978);
- Operational energy consumption across the building lifetime (module B6); and
- Transport emissions arising from occupant travel.

7.2.50 The Planning Application is a hybrid application, comprising a full, detailed application for the demolition of the existing buildings and the construction of 293 dwellings with associated infrastructure, together with an outline application (all matters reserved except access) for up to 2 further dwellings including the retention and conversion of the existing Langley Common Farmhouse. Embodied carbon has been estimated using sector benchmarks representing typical construction for this development type, pending confirmation of material specifications and quantities by the design team; the quantified assessment will be updated to reflect design-specific quantities as these are confirmed. This provides a robust basis for assessment whilst acknowledging that final emissions will depend upon detailed design decisions.

7.2.51 Emissions arising from the Proposed Development have been categorised using the framework established by the Greenhouse Gas Protocol, which distinguishes three scopes of emissions:

Scope 1

Direct emissions released from sources owned or controlled by the development, such as on-site combustion of fossil fuels for heating. As the Proposed Development specifies air source heat pumps with no gas connections, Scope 1 emissions from building operation will be zero.

Scope 2

Indirect emissions arising from the generation of purchased energy consumed by the development, principally grid-supplied electricity. These emissions occur at power stations rather than on site but are a direct consequence of the development's energy demand.

Scope 3

All other indirect emissions occurring in the wider value chain, including the embodied carbon of construction materials (modules A1-A5), transport of materials to site, and vehicle trips generated by occupants during the operational phase.

7.2.52 The assessment has sought to include emissions from all three scopes where these are material and can be reasonably estimated from available information, in order to capture the full range of GHG impacts attributable to the Proposed Development. The majority of emissions are expected to occur within the UK and therefore fall within the scope of national carbon budgets, although some Scope 3 emissions associated with imported construction materials may physically occur overseas.

7.2.53 Emissions from grid electricity (Scope 2) are reported on a location-based basis, using average grid emission factors; no market-based figures are relied upon. In accordance with the supplementary guidance, biogenic carbon has been considered as follows: no benefit is claimed for the carbon sequestered within timber products – the embodied carbon range reported reflects the lower manufacturing emissions of timber frame construction, and stored biogenic carbon is not netted off against fossil GHG emissions.

- 7.2.54 Stored biogenic carbon is reported separately, on an indicative benchmark basis, within the embodied carbon assessment, pending the design team's material schedule. Biogenic emission releases are not material to the Site, which comprises previously developed land with no large-scale vegetation loss or biomass combustion. Stored and emitted biogenic carbon will be confirmed and reported separately within the Whole Life Carbon Assessment recommended at detailed design stage, in accordance with the RICS methodology.
- 7.2.55 The emission factors applied incorporate all seven Kyoto Protocol 'basket' gases, expressed as CO₂e; no other climate forcers are considered material to a residential development of this nature and these have been scoped out.
- 7.2.56 The life cycle stages of the Proposed Development have been defined with reference to BS EN 15978, which provides a modular framework for the assessment of whole life carbon in buildings. The modules included within this assessment are as follows:

Table 7.7 Lifecycle stages considered within whole life carbon scope

Module	Lifecycle stage	Included in assessment?
A1–A3	Product stage — raw material extraction, transport to manufacturer, and manufacturing	Yes
A4	Transport of materials to site	Yes (within benchmarks)
A5	Construction and installation processes	Yes (within benchmarks)
B1–B5	In-use stage — maintenance, repair, replacement, refurbishment	Considered qualitatively; not quantified
B6	Operational energy use	Yes
B7	Operational water use	Not assessed as negligible contribution
C1–C4	End of life - deconstruction, transport, waste processing, disposal	Not quantified from design data; benchmark allowance included in the whole-life inventory (see below)
D	Benefits beyond the building lifecycle - reuse, recovery, recycling potential	Not assessed

- 7.2.57 Modules C1-C4 have not been quantified from design data: the dwellings have no defined end of life and demolition within the 60-year reference study period is not reasonably foreseeable. In accordance with the ISEP guidance on exclusions, a benchmark allowance of 5% of embodied carbon - approximately 700-850 tCO₂e - has been included within the whole-life inventory reported in this chapter, representing end-of-life emissions that would arise many decades hence in a substantially decarbonised economy. This allowance will be replaced by quantified end-of-life emissions within the Whole Life Carbon Assessment at detailed design stage.

Determining Significance

- 7.2.58 GHG emissions differ from most environmental effects in that they contribute to a cumulative global problem rather than causing discrete local impacts. Every tonne of CO₂e released contributes incrementally to climate change regardless of where it originates. For this reason, the sensitivity of the receptor - the global climate system - is treated as uniformly high, and any emission represents an adverse effect of some magnitude.
- 7.2.59 The question of significance is therefore based not on whether emissions occur, but on whether the Proposed Development's emissions profile is compatible with the trajectory of decarbonisation required to limit global warming. The ISEP guidance establishes a five-level framework for this evaluation:

Table 7.8 Significance levels

Level	Interpretation
Major Adverse	Emissions unmitigated or meeting only minimum regulatory requirements; incompatible with net zero trajectory
Moderate Adverse	Partial mitigation achieving some but not all applicable policy objectives; falling short of required decarbonisation pathway
Minor Adverse	Full compliance with current policy and good practice standards; aligned with necessary measures to achieve net zero
Negligible	Performance substantially exceeding current requirements; achieving near-zero emissions well ahead of 2050
Beneficial	Net negative emissions; actively removing carbon from the atmosphere relative to baseline

- 7.2.60 Effects assessed as Major or Moderate Adverse are considered significant in EIA terms. Minor Adverse and Negligible effects, while still representing some emission of GHGs, are considered not significant as they accord with the policy framework established to deliver the UK's climate commitments.
- 7.2.61 In accordance with the April 2026 supplementary guidance, significance has been evaluated separately for the construction and operational phases, as well as on a whole-life basis, and adverse and beneficial effects are not netted off against one another in reaching qualitative conclusions. Comparisons of project emissions against national and local carbon budgets are presented in this chapter as contextualisation only: the proportion of a carbon budget consumed by the Proposed Development is not used as a threshold for determining significance, which rests on the extent and quality of mitigation relative to a 1.5°C-compatible, net zero trajectory.
- 7.2.62 In accordance with the ISEP guidance, published expert advice on the adequacy of policy delivery forms part of the context for these judgements. As set out in the legislative framework above, the Climate Change Committee advises that the pace of emissions reduction must increase substantially to meet the Sixth Carbon Budget, with low-carbon heating, improved building energy performance and the electrification of transport central to the required trajectory. The significance judgements in this chapter therefore treat full compliance with current policy and good practice standards, rather than minimum regulatory compliance, as the appropriate benchmark for compatibility with the net zero trajectory.

Geographic Scope

- 7.2.63 For the climate change resilience strand, the study area is the Site as defined by the red line boundary shown in Chapter 1: Introduction. For the GHG emissions strand, effects on climate are not spatially confined; the assessment boundary is instead defined by the emission sources attributable to the Proposed Development, whether arising within or beyond the Site boundary (for example, the manufacture of construction materials and occupant travel), as set out in the Approach to GHG Assessment.

Temporal Scope

- 7.2.64 A 60-year design life for the Proposed Development is to be taken as the temporal boundary. This includes both the construction and operational phases of the development. The construction phase, at the start of the project timeline, will be more immediate and considerably shorter in duration – therefore future climate change is deemed less relevant during this phase.

Consultation

- 7.2.65 No topic-specific consultation has been undertaken for this chapter beyond the EIA scoping process. The scope of the assessment reflects the Scoping Opinion for the wider EIA, and the vehicle trip rates and trip generation figures applied in the transport emissions assessment have been agreed with Wokingham Borough Council.

Assumptions and Limitations

- 7.2.66 The EIA has been based on the best available information at the time of assessment and professional judgement has been exercised to ensure transparency and to support robust decision-making.
- 7.2.67 The Planning Application is a hybrid application: full and detailed in respect of 293 of the 295 dwellings proposed, with an outline element (all matters reserved except access) for up to 2 further dwellings. The assessment has been based on the design information available at the time of writing, including the Energy Statement and the traffic data prepared for the application. Where detailed design information remains to be confirmed – principally final material specifications and quantities, and the construction programme – established benchmarks and conservative, clearly stated assumptions have been applied, and the data sources used and their quality are identified in the relevant sections in accordance with PAS 2080. The quantified assessment will be reviewed as the remaining design information is confirmed. Emerging Policy CE5 of the Local Plan Update seeks a whole life carbon assessment for developments of 50 or more dwellings; the benchmark-based approach adopted in this chapter is an interim position pending the design team's material schedule, and a Whole Life Carbon Assessment may be undertaken at detailed design stage, if secured by planning condition as set out in the Summary for Securing Mitigation.
- 7.2.68 In addition to this, climate projections are predictive outputs from models based on the best available data and the trajectory could change based on updates to technologies or legislation. The climate projections used provide a probabilistic range of data which allows for known uncertainties.
- 7.2.69 Present day emission factors have been used, representing a conservative approach given the expected decarbonisation of the national grid over the coming years.

7.3 Baseline conditions

Existing Site Emissions

- 7.3.1 The Site comprises previously developed land currently in temporary use as a film studio, with modest activity generating GHG emissions: energy use in the existing buildings, and associated vehicle movements and maintenance activity. Baseline emissions are estimated at less than 50 tCO₂e annually, representing a negligible contribution that can effectively be treated as zero for assessment purposes. No credit is taken for the removal of these existing baseline emissions on redevelopment, which is conservative.

Current and Future Baseline Climate

- 7.3.2 Present-day climatic conditions are characterised by Met Office records showing a temperate maritime climate with moderate seasonal variation. However, observed trends already demonstrate the influence of anthropogenic climate change, with rising average temperatures and shifts in precipitation patterns evident in the historical record.
- 7.3.3 Future climate conditions have been characterised using the UK Climate Projections (UKCP18) published by the Met Office, applying the high emissions scenario (RCP8.5) as a reasonable worst case for the assessment of climate risks. The projections applied, together with the methodology, data and the likelihood and consequence scales used in the risk assessment, are set out in full in Appendix 7.2.
- 7.3.4 UKCP18 projections for the site location indicate the following changes under a high emissions scenario:

Temperature changes

- Annual mean temperatures rising 1.5-2.5°C by mid-century and 2.5-4.5°C by the 2080s relative to the 1981-2010 baseline
- Summer maximum temperatures increasing by 3-5°C by the 2080s
- Greater frequency and intensity of heatwave events

Precipitation changes

- Winter rainfall increasing by 10-30% by the 2080s
 - Summer rainfall decreasing by 10-40% by the 2080s
 - Individual rainfall events becoming more intense even where seasonal totals decrease
- 7.3.5 These projections inform both the assessment of climate risks to the Proposed Development and consideration of how changing conditions might affect other environmental receptors over the operational lifetime.

7.4 Inherent Design Mitigation

- 7.4.1 The iterative design process has embedded a range of measures that will reduce GHG emissions and enhance climate resilience. These inherent mitigation measures form part of the Proposed Development as assessed and are not contingent upon further commitments.
- 7.4.2 Mitigation has been identified and applied in accordance with the ISEP GHG Management Hierarchy (Eliminate – Reduce – Substitute – Remove): eliminating emissions at source (fossil-fuel-free heating), reducing demand (fabric performance and passive design), substituting lower-carbon alternatives (timber frame construction and renewable generation) and only thereafter considering removals or offsetting, none of which are relied upon in this assessment. Each embedded measure listed below satisfies the three tests of the April 2026 supplementary guidance: it is evidenced in the design, committed and capable of being secured (through the planning application, planning condition, S106 obligation or Building Regulations), and realistic and achievable.
- 7.4.3 These have been specifically included in the Proposed Development for the purposes of this EIA; as a result, the need for any further mitigation has been assessed on the basis of these measures already having been secured. The inherent mitigation measures are included to aid in avoiding significant adverse environmental effects.

Construction Phase

- 7.4.4 Measures incorporated into the construction approach include:
- Phased construction programme managing environmental effects across the build period;
 - Construction Environmental Management Plan (CEMP) addressing dust, water quality, traffic and other construction impacts;
 - Timber frame construction for residential buildings, substantially reducing embodied carbon compared to traditional masonry and concrete construction whilst sequestering carbon within the building fabric (for which no quantitative credit is taken in this assessment)

Operational Phase – Energy and Carbon

- 7.4.5 The energy strategy has been developed to deliver significant emissions reductions:
- All dwellings served by air source heat pumps, completely eliminating direct combustion emissions;
 - Building fabric and services exceeding the requirements of Building Regulations Part L 2021;
 - Annual regulated energy demand of c.816,273 kWh (an average of approximately 2,767 kWh per dwelling);
 - Roof-mounted photovoltaic arrays generating 818,481 kWh annually across the development - marginally exceeding total regulated energy demand;
 - All buildings designed as 'zero carbon ready', achieving operational net zero as the electricity grid completes its decarbonisation trajectory.

Operational Phase - Transport

7.4.6 Sustainable travel is supported through:

- Travel Plan implementation with monitoring and targets for modal shift
- Electric vehicle charging provision meeting Part S requirements
- Pedestrian and cycle routes connecting to local services and facilities
- Site location offering access to public transport networks.

Operational Phase – Climate Resilience

7.4.7 Resilience to future climate conditions is addressed through

- Prioritisation of passive cooling measures (orientation, shading, purge ventilation) over mechanical systems.
- Water efficiency measures achieving 105 litres internal usage per person per day;
- Sustainable drainage systems (SuDS) designed to manage increased rainfall intensity;
- Landscape strategy supporting biodiversity and providing cooling and shading.

7.5 Potential effects prior to additional mitigation

Construction Phase

Embodied Carbon

- 7.5.1 Construction requires materials whose manufacture, transport and installation generate GHG emissions - collectively termed embodied carbon. For residential development, the structural frame, foundations, building envelope and finishes typically dominate the embodied carbon profile. The full application also includes the demolition of the existing buildings; emissions associated with demolition and site clearance will be managed through the CEMP and quantified within the Whole Life Carbon Assessment capable of being secured by planning condition).
- 7.5.2 Pending confirmation of detailed material specifications and quantities by the design team, emissions have been estimated using established benchmarks for residential construction. The benchmarks are applied to a gross internal area of approximately 28,861 m², as implied by the benchmark assessment for the Proposed Development. The table below compares estimated emissions against a range of performance standards.

Table 7.9 Benchmark embodied carbon standards

	Benchmark (kgCO ₂ e/m ²)	Total Emissions (tCO ₂ e)
Current practice	850	24,531
Future Homes Standard expected	700	20,202
RIBA 2030 Climate Challenge	625	18,038
UKGBC Net Zero Standard	500	14,430
LETI 2030 Target	350	10,101

- 7.5.3 A conventional construction approach would generate approximately 24,531 tCO₂e of embodied emissions. However, the commitment to timber frame construction as inherent mitigation will substantially reduce this figure. Timber frame typically achieves 30-40% lower embodied carbon than masonry alternatives, resulting in actual emissions in the region of approximately 14,200-16,600 tCO₂e.
- 7.5.4 Ongoing maintenance and replacement of building elements will give rise to additional embodied carbon emissions during the lifetime of the dwellings. This will be highly dependent on resident choices and an estimation of impact is not feasible at this stage. Sector benchmarks indicate that lifecycle replacement and maintenance can add materially to initial embodied carbon over a 60-year period; these emissions can be quantified within the recommended Whole Life Carbon Assessment if conditioned, and their exclusion from the quantified inventory is identified as a limitation of this assessment. Given the wider decarbonisation context it is likely that lower carbon intensity materials are likely to be more widely available in future, further reducing the impacts of maintenance and refurbishment works. These have not been quantitatively assessed within this document.
- 7.5.5 In addition, the timber frame will sequester biogenic carbon within the building fabric for the life of the dwellings. Pending the design team's material schedule, benchmark timber quantities suggest sequestration in the order of 1,500-2,500 tCO₂e across the Proposed Development (to be confirmed from the material schedule). In accordance with the ISEP guidance, this sequestered biogenic carbon is reported separately for transparency and has not been netted off against the fossil GHG emissions reported in this chapter.

Contextualisation

- 7.5.6 To understand the significance of these emissions, they have been compared against science-based local carbon budgets and national totals.
- 7.5.7 The Tyndall Centre for Climate Change Research has published recommended carbon budgets for Wokingham Borough, consistent with a 1.5°C-aligned trajectory under the Paris Agreement. The recommended annual budgets are approximately
- 320,000 tCO₂ during the period 2023-2027
 - 160,000 tCO₂ per annum during 2028-2032.
- 7.5.8 These figures are taken from the Tyndall Centre data.
- 7.5.9 For the construction period 2027-2032, the cumulative Tyndall budget for Wokingham is approximately 1,120,000 tCO₂ (one year at 320,000 plus five years at 160,000).

- 7.5.10 Construction emissions of 14,200-16,600 tCO₂e would represent approximately 1.3-1.5% of this local carbon budget.
- 7.5.11 Against the UK's Sixth Carbon Budget of 965 MtCO₂e (2033-2037), the Proposed Development's construction emissions contribute approximately 0.0015-0.0017%, reflecting the inherent challenge of contextualising individual project emissions against national totals.
- 7.5.12 In accordance with the April 2026 supplementary guidance, these comparisons are presented for context only; they are not used as thresholds for determining significance, which is judged against the criteria set out in the assessment methodology.

Significance

- 7.5.13 The adoption of timber frame construction demonstrates active engagement with the decarbonisation agenda, delivering material reductions against conventional practice. This approach aligns with emerging policy direction and industry best practice, though does not yet achieve the most ambitious LETI 2030 targets that represent stretch goals for the sector which are likely to require further efforts to reduce the impacts of materials within the construction industry supply chain.
- 7.5.14 As such, construction phase GHG emissions are assessed as **Minor Adverse** - representing full compliance with applicable policy and good practice standards while acknowledging that any material emission constitutes some adverse effect. This is **not significant** in EIA terms.

Construction Traffic Emissions

- 7.5.15 Construction of the Proposed Development will generate vehicle movements comprising HGV deliveries of materials and plant, and construction worker travel to and from the Site. Emissions associated with the transport of materials to site (module A4) and with site construction activities, including plant fuel use (module A5), are accounted for within the benchmark rates applied in the embodied carbon assessment above.
- 7.5.16 Worker travel is additional to these benchmarks and has been estimated on the basis of stated assumptions: an average of 80 workers on site across a 5.5-year construction programme, an average round trip of 30 km, 260 working days per annum, and the conservative fleet-average car emission factor of 0.17 kgCO₂e/km. This gives approximately 105 tCO₂e per annum, and in the order of 580 tCO₂e across the construction period. These assumptions will be refined once the Construction Environmental Management Plan and construction programme are confirmed.
- 7.5.17 These emissions are small relative to the embodied carbon of construction (in the order of 3-4% of the construction-phase total) and do not alter the construction phase significance conclusion, which remains **Minor Adverse** and **not significant**.

Climate Risks

- 7.5.18 The construction period (2027-2032) falls within the near-term where climate conditions will not differ dramatically from present experience. However, the trend toward more frequent extreme weather events may already be evident. Key risks comprise:

Table 7.10 Construction phase climate risks

Hazard	Receptor (sensitivity)	Likelihood	Consequence	Magnitude	Level of effect (significance)
Worker heat stress during summer periods	Construction workers – site users (Medium)	Moderate	Moderate	Medium	Moderate adverse (significant)
Programme disruption from extreme weather	Works and temporary site infrastructure (Low)	Moderate	Minor	Low	Minor adverse (not significant)
Dust generation during dry periods	Site users and neighbouring occupants (Medium)	Low	Minor	Low	Minor adverse (not significant)

7.5.19 Applying the methodology set out in the 'Predicting Effects' section, construction workers are a receptor of Medium sensitivity (site users and occupants). Hot weather events of a severity capable of affecting worker welfare are of Moderate likelihood over the construction programme, with a Moderate consequence (temporary harm to health), giving a Medium magnitude of impact and, combined with the Medium sensitivity of the receptor, a **Moderate adverse** level of effect. This is **significant** prior to mitigation and warrants management through additional measures in the CEMP.

7.5.20 Programme disruption from extreme weather affects the works and temporary site infrastructure, a receptor of Low sensitivity; at Moderate likelihood and Minor consequence it gives a Low magnitude of impact and a **Minor adverse** level of effect. Dust generation during dry periods affects site users and neighbouring occupants, of Medium sensitivity; at Low likelihood and Minor consequence it gives a Low magnitude of impact and a **Minor adverse** level of effect. Both of these effects are **not significant**. The evidence supporting each likelihood and consequence rating is set out in Appendix 7.2.

Operational Phase

Energy Emissions

7.5.21 Building operation will consume electricity for heating (via heat pumps), hot water, lighting, ventilation and appliances. With no gas connections or other fossil fuel systems, the Proposed Development generates zero direct (Scope 1) emissions from building operation.

7.5.22 Indirect emissions arise from grid electricity consumption. Annual energy demand and associated emissions are set out below. Grid carbon intensity factors are taken from the DESNZ Supplementary Guidance to the HM Treasury Green Book (2023 dataset), 'Valuation of Energy Use and Greenhouse Gas Emissions for Appraisal', using domestic electricity factors:

Table 7.11 Operational phase emissions

Component	Annual Energy Demand (kWh)	Year 1 Emissions at 0.169kgCO ₂ e/kWh (tCO ₂ e)
Regulated Energy	816,273	138
Unregulated Energy	757,287	128
Total Demand	1,573,560	266
PV Generation *(estimated)	(818,481)	(138)
Net Consumption	755,079	128

Note: Grid carbon intensity of 0.169 kgCO₂e/kWh is the DESNZ projected domestic electricity factor for 2027. Energy demand and PV generation figures are from the Energy Statement prepared by AES Sustainability Consultants.

7.5.23 Based on the estimated PV generation required to comply with the Future Homes Standard, PV generation is roughly equal to total regulated energy demand. On an annual basis, the Proposed Development therefore achieves net zero carbon for regulated operational energy from first occupation.

7.5.24 Grid decarbonisation will progressively reduce emissions from unregulated loads. The following table uses DESNZ projected domestic grid factors to project emissions over time.

Table 7.12 Operational emissions projections

Year	Grid carbon factor (kgCO ₂ e/kWh)	Annual Emissions	Net Emissions after PV
2027	0.169	266	128
2030	0.093	146	70
2035	0.025	39	19
2040	0.007	11	5
2050	0.001	2	1

Source: DESNZ Green Book Supplementary Guidance, 2023 dataset. Factors for 2050 onwards are projected at 0.0014 kgCO₂e/kWh (domestic), declining to near-zero and remaining flat from 2050.

7.5.25 Lifetime operational energy emissions over the 60-year assessment period (2027-2086) total approximately 1,460 tCO₂e gross, or 700 tCO₂e net after crediting PV generation at the same grid carbon intensity. The majority of these lifetime emissions occur within the first decade of operation, before grid decarbonisation substantially eliminates indirect emissions. Lifetime totals are derived by linear interpolation between the tabulated years, with factors held flat beyond 2050.

Significance

7.5.26 The Proposed Development demonstrates strong alignment with decarbonisation objectives:

- Zero direct emissions from building operation;
- Renewable generation exceeding regulated demand;
- Rapid reduction of residual emissions through grid decarbonisation;
- Energy performance exceeding current Building Regulations

7.5.27 As such, operational energy emissions are assessed as **Minor Adverse**, transitioning toward **Negligible** as grid decarbonisation progresses. This is **not significant** in EIA terms.

Transport Emissions

- 7.5.28 Residents will generate vehicle trips for commuting, shopping, leisure and other purposes. The i-Transport traffic data accompanying the planning application provides link-level AADT flows for several scenarios. Scenario 3 represents the net difference in traffic flows between the 'with development' and 'without development' cases (Scenario 2 minus Scenario 1). However, this scenario captures the combined effect of 295 dwellings at Arborfield Studios and an additional 60 dwellings at Barkham Square (the uplift from 600 to 660 units), and therefore overstates the traffic attributable to Arborfield Studios alone.
- 7.5.29 In the absence of a Site-specific trip generation figure for the Proposed Development in isolation, the transport emissions assessment is informed by the trip generation rates used within the Transport Assessment.
- 7.5.30 Vehicle trip rates have been calculated from Automatic Traffic Count (ATC) surveys undertaken at Oak Drive, located directly east of the Site. These surveyed rates were then adjusted downward by 10% to account for future changes in travel behaviour and vehicle movements associated with:
- full delivery of facilities and services as part of Arborfield Green, including the district centre;
 - full operation of the bus route serving Arborfield Green and the development Site; and
 - borough-wide initiatives to influence and reduce the need to travel, including MyJourney.
- 7.5.31 The resulting trip rates and trip generation figures have been agreed with Wokingham Borough Council. The table below summarises the surveyed and adjusted trip rates per dwelling, together with the modelled and proposed trip generation totals.

Table 7.13 Arborfield vehicle trip rates

	AM Peak (0800-0900)			PM Peak (1700-1800)			Daily		
	Arr	Dep	2-way	Arr	Dep	2-way	Arr	Dep	2-way
Surveyed Trip Rate (per dwelling)	0.208	0.444	0.652	0.336	0.204	0.54	2.204	2.352	4.556
Proposed Trip Generation (295 dwellings)	55	118	173	89	54	143	586	624	1,210

- 7.5.32 All transport modelling undertaken for the Transport Assessment assumes a quantum of 295 dwellings.

Emission Factor Methodology

- 7.5.33 GHG emission factors for transport have been derived from two UK Government sources.
- 7.5.34 The Department for Transport's Transport Analysis Guidance (TAG) Data Book (December 2025, v2.03FC), specifically Table A 3.3, which provides projected carbon dioxide emission rates per litre of fuel burnt and per kWh of electricity consumed, by fuel type and year; and

- 7.5.35 The UK Government GHG Conversion Factors for Company Reporting (DESNZ and BEIS, 2024), which provide direct vehicle emission factors in kgCO₂e per kilometre by vehicle type.
- 7.5.36 The TAG Data Book is published annually by the Department for Transport as part of the UK Government's WebTAG transport appraisal framework. It is the standard source of emission factors used for assessing transport-related GHG impacts in UK planning, EIA, and transport assessment practice. The TAG projections are forward-looking and year-specific, accounting for anticipated improvements in vehicle efficiency and the progressive electrification of the vehicle fleet, enabling emissions to be forecast across the assessment lifetime.
- 7.5.37 The DESNZ GHG Conversion Factors for Company Reporting provide a complementary dataset, expressing average vehicle emissions directly in kgCO₂e per kilometre. These factors represent the current UK average vehicle fleet. An updated set of conversion factors was published by DESNZ in June 2026, incorporating a revised electricity methodology; the 2024 factors have been retained throughout this assessment for internal consistency, and given the conservative adoption of the petrol-only car factor for all trips this retention does not affect the conclusions reached.

Selection of Emission Factor for Present-Day Assessment

- 7.5.38 For the present-day (conservative) assessment, a petrol car emission factor of approximately 0.17 kgCO₂e/km has been adopted, taken from the DESNZ GHG Conversion Factors for Company Reporting (2024). This approach is considered conservative for the following reasons:
- Fleet composition is ignored in favour of the highest-emitting mainstream fuel type. Current UK fleet data (DfT/DVLA, 2025; SMMT, 2026) indicates the registered car fleet comprises approximately 58% petrol, 32% diesel, and approximately 6% battery electric vehicles (BEV), with the remainder being hybrid and other fuel types. Diesel cars have a marginally lower CO₂e/km factor than petrol equivalents, and BEVs have a substantially lower factor (approximately 0.05 kgCO₂e/km at current grid carbon intensity). A fleet-weighted average emission factor would therefore be lower than the petrol-only factor adopted. By applying the petrol car factor to all trips, the assessment overstates emissions relative to the actual fleet mix.
 - No account is taken of fleet electrification over the assessment lifetime. The basis for the projected transition is set out under Fleet Electrification Assumptions below. The present-day petrol factor therefore significantly overstates the fleet-average emission rate that will apply during the operational lifetime of the Proposed Development.
 - The assessment assumes all trips are car-based. Modal shift to bus use facilitated by the planned bus route serving Arborfield Green has not been credited as a reduction in emissions. In practice, a proportion of resident trips will be made by bus, on foot or by bicycle, reducing per-capita car emissions below the rate assessed.

- 7.5.39 This conservative approach is consistent with the methodology adopted in comparable recent EIA assessments within Wokingham Borough.

Calculation of Annual Transport Emissions

- 7.5.40 The Proposed Development is estimated to generate 1,354 two-way vehicle trips per day. Multiplied conservatively over 365 days, this equates to approximately 494,210 annual vehicle trips.

- 7.5.41 GHG emissions from transport have been calculated by applying these annual trip figures to a commuting distance of 19km, derived from Census data on distance travelled to work for the local area. The assessment focuses on car-based commuting trips and does not account for modal shift to bus use, or the assumption that many journeys will be shorter local (non-commuting) journeys, presenting a conservative (worst-case) scenario.
- 7.5.42 An emission factor of 0.17 kgCO₂e/km has been adopted, which multiplied by the total vehicle-kilometres figure 9.39 million kilometres equates to annual transport emissions of approximately 1,600tCO₂e per annum.
- 7.5.43 Transport, therefore, represents the largest single source of ongoing operational emissions. However, this figure will reduce substantially as electric vehicles increase their share of market size, a transition expected to be largely complete by the mid-2030s following the phase-out of new petrol and diesel car sales.

Future-Year Transport Emissions Projection

- 7.5.44 The present-day assessment adopts a conservative petrol car emission factor of 0.17 kgCO₂e/km applied uniformly to all vehicle trips. In practice, transport emissions will decline substantially over the operational lifetime of the Proposed Development as the UK vehicle fleet transitions to electric propulsion.

Fleet Electrification Assumptions

- 7.5.45 The UK Zero Emission Vehicle (ZEV) mandate requires 80% of new car sales to be zero emission by 2030, rising to 100% by 2035. However, fleet composition lags behind new sales due to average vehicle lifetimes of approximately 14 years. Based on current DfT/DVLA registration data, SMMT new vehicle registration trends, and the ZEV mandate trajectory, the following fleet composition has been assumed:

Table 7.14 Vehicle fleet electrification assumptions

Year	BEV	Petrol	Diesel	Hybrid/PHEV
2027	8%	55%	30%	7%
2030	18%	48%	25%	9%
2035	40%	33%	15%	12%
2040	65%	18%	7%	10%
2050	92%	3%	1%	4%

Emission factors by vehicle and fuel type

- 7.5.46 For internal combustion engine (ICE) vehicles, per-kilometre emission factors have been held constant at present-day rates: 0.17 kgCO₂e/km for petrol cars and 0.16 kgCO₂e/km for diesel cars, taken from the DESNZ GHG Conversion Factors for Company Reporting (2024). For hybrid/PHEV vehicles, an emission factor of 0.09 kgCO₂e/km has been adopted, reflecting part-electric operation.
- 7.5.47 For battery electric vehicles (BEV), emissions depend on grid carbon intensity. An average BEV electricity consumption of 0.17 kWh/km has been assumed, combined with the TAG Data Book (December 2025, v2.03FC, Table A 3.3) projected electricity (roads) emission factors to derive per-kilometre BEV emission rates at each assessment year:

Table 7.15 EV emissions factors over time

Year	TAG Electricity Factor (kgCO ₂ e/kWh)	BEV Emission Factor (kgCO ₂ e/km)
2027	0.169	0.029
2030	0.093	0.016
2035	0.042	0.007
2040	0.007	0.001
2050	~0.0	~0

7.5.48 Note: the TAG electricity (roads) factors applied to BEV charging differ from the Green Book domestic electricity factors applied to building energy use (for example, 0.042 versus 0.025 kgCO₂e/kWh in 2035), reflecting the different published datasets; each is applied unamended from its respective source.

Fleet emission factors

7.5.49 Combining the projected fleet composition with per-km emission factors by fuel type produces a blended average emission factor for each assessment year.

Table 7.16 Blended vehicle emissions factors and total emissions

Year	Blended Emission Factor (kgCO ₂ e/km)	Annual Transport Emissions (tCO ₂ e)	Reduction from present-day assessment
Present	0.170	1,600	-
2027	0.150	1,410	12%
2030	0.133	1,250	22%
2035	0.094	880	45%
2040	0.051	480	70%
2050	0.010	95	94%

7.5.50 By the time the Proposed Development is fully occupied and established (anticipated early 2030s), annual transport emissions are projected to be in the region of 880–1,250 tCO₂e/annum, declining to approximately 480 tCO₂e by 2040 and reducing to under 100 tCO₂e per annum by 2050. Over the 60-year assessment lifetime (2027-2086), the cumulative transport emissions are estimated at approximately 19,800 tCO₂e, the large majority of which arise in the first decade of operation before fleet electrification takes full effect. Lifetime totals are derived by linear interpolation between the tabulated assessment years, with emission factors held flat beyond 2050.

Contextualisation

7.5.51 The Tyndall Centre for Climate Change Research has recommended annual carbon budgets for Wokingham Borough consistent with a 1.5°C-aligned trajectory under the Paris Agreement. The recommended budget during the period 2028-2032 is approximately 160,000 tCO₂/annum.

7.5.52 Transport emissions from the Proposed Development of approximately 1,600 tCO₂e would represent approximately 1.0% of this budget using present-day emission factors. This proportion will decline substantially over time as fleet electrification and grid decarbonisation progress.

- 7.5.53 For further context, the UK local authority greenhouse gas emissions statistics published by DESNZ report total emissions for Wokingham Borough of approximately 700,000 tCO₂e per annum (2022 data; this contextual figure will be refreshed from the DESNZ 2005-2024 release, published June 2026, prior to submission [2024 dataset refresh pending]). The Proposed Development's transport emissions of approximately 1,600 tCO₂e per annum represent approximately 0.23% of this Borough-wide total.
- 7.5.54 As above, this contextualisation is presented for information only and does not form the basis of the significance conclusion.

Significance

- 7.5.55 While transport emissions are material, they are substantially outside the direct control of the Proposed Development. National policy measures including vehicle emission standards and the zero emission vehicle mandate will drive fleet decarbonisation as detailed. The Proposed Development supports this transition through EV charging infrastructure and Travel Plan measures promoting modal shift. By the time the Proposed Development is fully occupied (anticipated early 2030s), the fleet-average emission rate is expected to be materially lower than the present-day factor used in this assessment.
- 7.5.56 Fleet electrification is not treated as mitigation provided by the Proposed Development. The transition of the national vehicle fleet to electric propulsion is driven by the statutory ZEV mandate and wider national policy, will occur irrespective of the Proposed Development, and is outside the Applicant's control. It is therefore properly characterised as part of the evidenced future baseline against which the effects of the Proposed Development are assessed, consistent with the requirement of the April 2026 supplementary guidance that future baselines be evidence-based and conservative. The fleet composition assumptions in Table 7.14 are drawn from DfT/DVLA registration data, SMMT registration trends and the ZEV mandate trajectory, and present-day emission factors have been applied to each vehicle type without assuming any improvement in ICE vehicle efficiency, which is conservative.
- 7.5.57 A sensitivity test has been applied so that the conclusion does not rest on the pace of that transition. Were fleet electrification to progress materially more slowly than projected – for example, were the fleet composition assumed for 2035 not reached until 2040 – annual transport emissions would remain in the region of 1,250 tCO₂e per annum into the late 2030s before declining. Under this slower-uptake scenario the embedded transport measures (Travel Plan, EV charging provision, and pedestrian and cycle connectivity) would continue to support mode shift and the uptake of lower-emission travel, and the conclusion below would not change.
- 7.5.58 Assessed against the evidenced future baseline, and taking account of the embedded transport measures secured through the application, operational transport emissions are assessed as **Minor Adverse** and **not significant**. This conclusion is reached prior to, and without reliance upon, any additional mitigation.

Climate Risks

7.5.59 Climate projections indicate increasing risks from heat, drought and intense rainfall over the development's operational lifetime:

Table 7.17 Operational climate risks

Hazard	Receptor (sensitivity)	Likelihood	Consequence	Magnitude	Level of effect (significance)
Overheating of dwellings	Future occupants (Medium)	High	Moderate	High	Major (significant)
Surface water flooding	Future occupants and property (Medium)	Moderate	Moderate	Medium	Moderate (significant)
Water resource pressure	Future occupants (Medium)	Moderate	Minor	Low	Minor (not significant)
Storm damage	Buildings and infrastructure (Low)	Low	Moderate	Low	Minor (not significant)
Subsidence from soil shrinkage	Buildings and infrastructure (Low)	Moderate	Minor	Low	Minor (not significant)

7.5.60 Applying the same methodology, future occupants are a receptor of Medium sensitivity (site users and occupants). Overheating of dwellings is of High likelihood over the operational lifetime with a Moderate consequence, giving a High magnitude of impact and, combined with the Medium sensitivity of the receptor, a **Major adverse** level of effect prior to mitigation, which is **significant**.

7.5.61 Surface water flooding is of Moderate likelihood with a Moderate consequence, giving a Medium magnitude of impact and a **Moderate adverse** level of effect prior to mitigation, which is **significant**.

7.5.62 Water resource pressure (Moderate likelihood, Minor consequence, affecting future occupants of Medium sensitivity), storm damage (Low likelihood, Moderate consequence, affecting buildings and infrastructure of Low sensitivity) and subsidence from soil shrinkage (Moderate likelihood, Minor consequence, affecting buildings and infrastructure of Low sensitivity) each give a Low magnitude of impact and a Minor adverse level of effect, which is not significant.

7.5.63 The evidence supporting each likelihood and consequence rating is set out in Appendix 7.2 alongside the scales applied.

7.6 Additional Mitigation

Construction Phase

Embodied Carbon

7.6.1 Beyond the inherent commitment to timber frame construction, the following measures are recommended to drive embodied carbon toward sector-leading performance:

- Commission a Whole Life Carbon Assessment at detailed design stage (RIBA Stage 4) following RICS methodology;
- Establish an embodied carbon target aligned with UKGBC Net Zero Carbon Buildings Standard requirements for the year of construction;
- Specify materials with verified Environmental Product Declarations demonstrating lower-than-average carbon intensity;
- For concrete elements, use concrete mixes with reduced cement content by replacing part of the cement with lower-carbon industrial by-products such as slag or fly ash;
- Prioritise locally-sourced materials where performance requirements permit;
- Implement site waste management planning to minimise material wastage.

7.6.2 Full adoption of these measures could reduce embodied carbon toward 10,000-12,000 tCO₂e, representing best practice performance for this development type.

Climate Resilience

7.6.3 A Construction Environmental Management Plan is an embedded measure secured by planning condition. As additional mitigation, over and above the measures that would be standard within a CEMP, the CEMP will incorporate specific heat stress management protocols for construction workers during summer months, in line with HSE guidance on outdoor working; the resulting reduction in the level of effect is reported in the Residual Effects section.

Operational Phase

Energy Emissions

7.6.4 No additional mitigation is proposed for energy emissions.

Transport Emissions

7.6.5 The Travel Plan (with monitoring and targets), EV charging provision in accordance with Part S, and the pedestrian and cycle connections are embedded (inherent) mitigation measures: they are evidenced in the design, secured through the planning application (Travel Plan obligation / S106 agreement, Building Regulations Part S, and the site layout respectively), and realistic and achievable. They are accounted for in the assessment of effects above and, to avoid double-counting, are not claimed again as additional mitigation.

7.6.6 One genuinely additional measure is proposed: support for car club and shared mobility services. If delivered – to be secured through the Travel Plan / S106 agreement – this would further reduce resident car use and associated emissions. The significance conclusions of this chapter do not rely upon this measure.

Climate Risks

- 7.6.7 The overheating assessment and mitigation required under Approved Document O is taken forward as additional mitigation, allowing the effects reported above to be described prior to its application. The remaining measures addressing the identified climate risks are embedded within the design and secured through the application, and are restated here with their securing mechanisms:

Overheating

- Overheating assessment and mitigation in accordance with Approved Document O to be demonstrated through detailed thermal modelling.

Flood Risk

- Flood Risk Assessment defining site-specific mitigation requirements;
 - SuDS designed with appropriate climate change allowances;
- 7.6.8 Compliance with Approved Document O will be demonstrated through detailed thermal modelling submitted for Building Regulations approval; this overheating assessment and mitigation is additional mitigation, and the resulting reduction in the level of effect is reported in the Residual Effects section.
- 7.6.9 The Flood Risk Assessment and the SuDS design, incorporating the Environment Agency's recommended climate change allowances, are secured through planning condition and approval by the Lead Local Flood Authority; these are embedded measures and no additional mitigation is proposed in respect of flood risk. Should monitoring over the lifetime of the development identify residual overheating or drainage performance issues, adaptive measures would be considered through the estate management arrangements; the conclusions of this chapter do not rely upon such measures.

7.7 Residual Effects

Construction Phase

Embodied Carbon

- 7.7.1 As the initial effect is minor adverse and not significant, no additional mitigation is required, and therefore, effects remain as **minor adverse** and **not significant**.
- 7.7.2 The additional measures recommended above (Whole Life Carbon Assessment, embodied carbon target, EPD-based procurement, cement substitution, local sourcing and site waste management) would, if adopted in full, reduce embodied carbon further, toward approximately 10,000-12,000 tCO₂e. They are recommended as good practice consistent with the GHG Management Hierarchy; the significance conclusion does not rely upon them.

Transport Emissions

- 7.7.3 Construction traffic emissions form part of the construction phase inventory (modules A4-A5, with worker travel estimated separately). As the initial effect is minor adverse and not significant, no additional mitigation is required beyond the measures embedded within the CEMP, and therefore, effects remain as **minor adverse** and **not significant**.

Climate Risks

- 7.7.4 The Moderate adverse level of effect identified for worker heat stress is managed through the additional heat stress protocols incorporated within the CEMP, which is secured by planning condition. With these protocols in place the consequence of a hot weather event reduces to Minor, giving a Low magnitude of impact and a **Minor adverse** residual level of effect, which is **not significant**, and no further mitigation is required. All other construction phase climate risks are of a **Minor adverse** level of effect and **not significant**, and remain so.

Operational Phase

Energy Emissions

- 7.7.5 As the initial effect is minor adverse (reducing toward negligible as the grid decarbonises) and not significant, no additional mitigation is required, and therefore, effects remain as **minor adverse**, reducing to **negligible**, and **not significant**.

Transport Emissions

- 7.7.6 As the initial effect – assessed against the evidenced future baseline of fleet electrification and taking account of the embedded transport measures – is minor adverse and not significant, no additional mitigation is required. The proposed support for car club and shared mobility services would, if delivered, further reduce emissions, but is not relied upon. Effects therefore remain as **minor adverse** and **not significant**.

Climate Risks

- 7.7.7 The Major adverse level of effect identified for overheating is reduced through the additional mitigation identified above: compliance with Approved Document O demonstrated through detailed thermal modelling, over and above the passive cooling measures embedded within the design.
- 7.7.8 The Moderate adverse level of effect identified for surface water flooding is addressed through embedded, secured measures: the Flood Risk Assessment and SuDS design incorporating the Environment Agency's recommended climate change allowances, approved by the Lead Local Flood Authority. With these measures in place the likelihood and consequence of each hazard reduce to Low and Minor respectively, giving a Low magnitude of impact and a **Minor adverse** residual level of effect for each. Both of these effects are **not significant**.
- 7.7.9 All other operational climate risks are of a **Minor adverse** level of effect and **not significant**, and remain so. No additional mitigation is required.

Conclusion

- 7.7.10 No significant residual adverse effects are identified. The significant effects identified prior to mitigation – a Major adverse level of effect for overheating of dwellings, and Moderate adverse levels of effect for construction worker heat stress and for surface water flooding – are each reduced to a Minor adverse level of effect, and not significant, by embedded and additional measures that are secured through the application. The conclusions reached do not rely upon measures that are not secured.

7.8 Inter-related Climate Effects

7.8.1 Climate change has the potential to alter the way in which other environmental effects of the Proposed Development manifest, either by changing the sensitivity of receptors or by modifying impact pathways. This section provides a qualitative assessment of these inter-relationships, drawing on the climate projections set out in the baseline conditions and the findings of other ES chapters.

7.8.2 The principal inter-related effects identified are:

Ecology and Biodiversity

7.8.3 Projected increases in summer temperatures and reductions in summer rainfall may increase drought stress on newly established habitats, potentially affecting the pace at which biodiversity net gain targets are realised. Conversely, milder winters may extend growing seasons. The ecological assessment (Chapter 8: Ecology) has considered baseline habitat conditions. Changing climatic conditions over the operational lifetime may alter the sensitivity of ecological receptors to development-related pressures such as disturbance, changes in hydrology, and air quality effects.

Water Environment and Flood Risk

7.8.4 Increases in winter precipitation intensity projected under UKCP18 may increase surface water flood risk beyond present-day modelling assumptions. The drainage strategy incorporating SuDS has been designed with appropriate climate change allowances in accordance with Environment Agency guidance.

7.8.5 The interaction between increased rainfall intensity and development-related changes to impermeable area may increase both the frequency and the depth of surface water ponding within and downstream of the Site beyond that predicted under present-day assumptions. The Flood Risk Assessment and drainage strategy assess flood-specific measures; the relevance for this chapter is that climate change places increasing pressure on those measures over the development lifetime.

7.8.6 The SuDS design therefore incorporates the Environment Agency's recommended climate change allowances for peak rainfall intensity, providing headroom for this intensification, and the residual in-combination effect is not considered to alter the significance conclusions of the flood risk assessment reported with the application.

Landscape and Visual

7.8.7 Extended periods of drought during summer months may affect the establishment and long-term viability of landscape planting, potentially reducing the effectiveness of visual screening and green infrastructure provision over time. Species selection within the landscape strategy should account for projected climatic conditions.

Transport and Air Quality

7.8.8 Higher temperatures may increase ground-level ozone formation in the presence of traffic-related pollutants. However, the transition to electric vehicles over the operational lifetime is expected to substantially reduce roadside pollutant concentrations, offsetting any climate-driven increase in sensitivity.

Human Health and Wellbeing

- 7.8.9 Increased frequency and intensity of heatwave events may heighten the sensitivity of future residents to overheating risk. This has been addressed through compliance with Approved Document O and the incorporation of passive cooling measures within the building design.

Conclusion

- 7.8.10 These inter-related effects do not alter the significance conclusions reached in the respective ES chapters but are noted to demonstrate that the potential for climate change to influence other environmental effects has been considered within the assessment.

7.9 Cumulative effects

- 7.9.1 This section summarises the cumulative effects associated with the Proposed Development.

- 7.9.2 It considers the following effects:

- Intra-Project Effects: relates to the inter-relationship between topics and those effects of the Proposed Development which, when considered together, may have a combined effect on a receptor.
- Inter-Project Effects: those effects of the Proposed Development and other committed developments.

- 7.9.3 Intra-project effects - the interaction of climate change with the other environmental topics - are addressed in the Inter-related Climate Effects section above; the remainder of this section therefore addresses inter-project (cumulative) effects. All development within the Borough will be subject to consistent policy requirements addressing energy efficiency, renewable energy and sustainable transport. Cumulative GHG impacts will therefore, be managed through the application of common standards driving sectoral decarbonisation.

- 7.9.4 Strategic infrastructure planning - including schools and local services - will help reduce travel demand across the growth area. Green infrastructure networks will provide cooling and sustainable drainage benefits for new landscape planting.

- 7.9.5 The Proposed Development's GHG emissions are proportionate to its scale and fully compliant with policy. No significant adverse cumulative effects are identified.

Barkham Square

- 7.9.6 The Proposed Development at Arborfield Studios is assessed in the context of proposals for up to 600 dwellings at Barkham Square, located on land to the north. Together with the 295 dwellings at Arborfield Studios, these schemes form part of the wider allocation within the emerging Local Plan for the Arborfield Green area.

- 7.9.7 The cumulative GHG impact of both schemes during construction will be proportionally greater than Arborfield Studios alone, reflecting additional embodied carbon from the Barkham Square dwellings. However, as both schemes will be subject to the same Building Regulations requirements and are expected to adopt comparable construction approaches, the per-dwelling emissions intensity is not anticipated to differ materially. The combined embodied carbon of both schemes would remain a small proportion of the Tyndall Centre recommended carbon budget for Wokingham during the construction period.

- 7.9.8 During operation, the combined effect of all dwellings will generate greater cumulative energy and transport emissions than either scheme in isolation. The transport assessment accompanying the planning application already accounts for this combined effect – the Scenario 3 traffic data captures the net traffic impact of both the Proposed Development and the Barkham Square uplift. Operational energy emissions will scale broadly in proportion to the additional dwelling numbers but will follow the same trajectory of decline through grid decarbonisation, given that both schemes will be served by heat pumps and will achieve zero direct emissions from building operation.
- 7.9.9 In terms of climate resilience, the combined development does not introduce materially different risks to those assessed for Arborfield Studios alone. Both schemes fall within the same drainage catchment and will be served by a coordinated sustainable drainage strategy designed with appropriate climate change allowances. The cumulative effect on surface water flood risk has been considered within the drainage design for the wider allocation.
- 7.9.10 The cumulative climate change effects of the Proposed Development in combination with Barkham Square are not anticipated to alter the significance conclusions reached for the Proposed Development alone. The combined effect remains **Minor Adverse** and **not significant**.

Wider Committed Development

- 7.9.11 The Proposed Development sits within an area of increasing evolution, with additional areas for expansion proposed nearby.
- 7.9.12 The Arborfield Green area has been identified as an area of additional development within the Wokingham Borough Council new Local Plan.
- 7.9.13 This includes the 295 dwellings proposed on the land currently occupied by the film studios off Langley Common Road (this Proposed Development), as well as up to 600 further homes on land to the north, known as Barkham Square, which is assessed specifically above.
- 7.9.14 The local plan outlines specific requirements for minimising the impact of such development, including woodland, open spaces, and parks, as well as footpaths and cycle links to existing neighbourhoods and beyond.
- 7.9.15 All new housing will be required to be zero carbon where this is achievable to minimise the impacts of climate change.
- 7.9.16 The Local Plan also outlines the requirement for developers to provide infrastructure, including a new primary school, plus early years provision, reducing the need to travel by car through the provision of local facilities.
- 7.9.17 In GHG terms, and in accordance with the ISEP guidance, the cumulative assessment is addressed through contextualisation: the emissions of each scheme are assessed against the same national and local carbon budgets and the same policy framework, rather than by summing the emissions of neighbouring schemes, which would not provide a meaningful test of significance. All committed development in the area will be subject to the same Building Regulations trajectory and to the emerging Local Plan requirement for new housing to be zero carbon where achievable, and the conclusions of this chapter are therefore not altered by the wider committed development.

- 7.9.18 For climate resilience, the principal cumulative consideration is the management of surface water across the wider Arborfield Green area, which is addressed through the coordinated drainage strategy for the allocation, designed with appropriate climate change allowances. No cumulative effects of greater significance than those reported for the Proposed Development alone are identified. The cumulative effect of the Proposed Development together with the wider committed development is therefore assessed as **Minor Adverse** and **not significant**.

7.10 Summary and Conclusions

- 7.10.1 This assessment has examined the Proposed Development's relationship with climate change, addressing both its contribution to GHG emissions and its resilience to projected climatic shifts.

- 7.10.2 GHG emissions have been quantified across construction and operational phases:

- Embodied carbon of approximately 14,200-16,600 tCO₂e (with timber frame construction), representing approximately 1.3-1.5% of the Tyndall Centre's recommended cumulative carbon budget for Wokingham over the construction period.

Residual Effect: Minor Adverse (not significant).

- Operational energy generating 266 tCO₂e/year gross but with PV generation exceeding regulated demand. Zero direct combustion emissions. Net emissions of 128 tCO₂e/year declining to under 5 tCO₂e by 2040 through grid decarbonisation. Lifetime total approximately 1,460 tCO₂e gross / 700 tCO₂e net over 60 years.

Residual Effect: Minor Adverse trending to Negligible (not significant).

- Transport generating approximately 1,600 tCO₂e/year initially (0.23% of Wokingham's baseline emissions), projected to decline to approximately 880 tCO₂e by 2035 and 480 tCO₂e by 2040 as the vehicle fleet electrifies.

Residual Effect: Minor Adverse (not significant).

- 7.10.3 On a whole-life basis, the aggregate GHG emissions attributable to the Proposed Development over the 60-year assessment period are estimated at approximately 36,000-38,500 tCO₂e, comprising embodied carbon of 14,200-16,600 tCO₂e, construction worker travel of approximately 580 tCO₂e, net operational energy emissions of approximately 700 tCO₂e, operational transport emissions of approximately 19,800 tCO₂e assessed against the evidenced future baseline, and a benchmark end-of-life allowance (modules C1-C4) of approximately 700-850 tCO₂e as set out in the assessment methodology.

- 7.10.4 Applying the significance criteria set out in the assessment methodology to this whole-life inventory, and without netting adverse effects against beneficial contributions, the whole-life effect of the Proposed Development is assessed as **Minor Adverse** and **not significant**, consistent with the conclusions reached for each lifecycle stage.

- 7.10.5 Climate resilience has been assessed against UKCP18 projections. Prior to mitigation, overheating of dwellings is assessed as a Major adverse level of effect and surface water flooding as a Moderate adverse level of effect, both significant. Overheating is managed through the additional overheating assessment and mitigation under Approved Document O; surface water flooding through embedded SuDS designed with climate change allowances. All residual climate risks are assessed as **Minor adverse** and **not significant**.

7.10.6 The Proposed Development embodies a comprehensive response to the climate emergency:

- Zero carbon ready design eliminating fossil fuel dependency;
- Renewable energy generation matching regulated demand from first occupation;
- Low-carbon construction through timber frame specification;
- Adaptation measures addressing identified climate risks.

7.10.7 Overall, the Proposed Development will not give rise to significant adverse effects in relation to climate change. The assessment demonstrates that climate considerations have been thoroughly integrated into project design, supporting the transition to net zero in accordance with national and local policy objectives.

7.11 References

- The Town and Country Planning (Environmental Impact Assessment) Regulations 2017
- Climate Change Act 2008 (as amended 2019)
- National Planning Policy Framework (MHCLG, February 2025)
- ISEP (2026) Assessing greenhouse gas emissions and evaluating their significance with supplementary guidance (Edition 2.1)
- IEMA (2020) EIA Guide to Climate Change Resilience and Adaptation (June 2020)
- UKCP18 Climate Projections (Met Office Hadley Centre)
- Tyndall Centre for Climate Change Research - carbon budget data for Wokingham Borough (carbonbudget.manchester.ac.uk)
- DESNZ (2023) Valuation of Energy Use and Greenhouse Gas: Supplementary guidance to the HM Treasury Green Book
- DESNZ and BEIS (2024) Government Conversion Factors for Company Reporting of Greenhouse Gas Emissions
- RICS (2023) Whole Life Carbon Assessment for the Built Environment, 2nd Edition
- UKGBC (2024) UK Net Zero Carbon Buildings Standard, Pilot Version
- LETI (2020) Climate Emergency Design Guide
- RIBA (2021) 2030 Climate Challenge
- Defra (2022) UK Climate Change Risk Assessment 2022 (CCRA3)
- Defra (2023) The Third National Adaptation Programme (NAP3)
- Climate Change Committee (2025) Progress in Reducing Emissions: Report to Parliament
- DESNZ (2026) UK Local Authority and Regional Greenhouse Gas Emissions National Statistics, 2005 to 2024
- Wokingham Borough Council (2022) Climate Change Interim Policy Position Statement
- Department for Transport (2025) TAG Data Book, December 2025 (v2.03FC)
- Department for Transport / DVLA (2025) Vehicle Licensing Statistics
- SMMT (2026) New Car Registration Statistics
- i-Transport LLP, Transport Assessment accompanying the Planning Application
- UKGBC (2022) Framework for Measuring and Reporting of Climate-related Physical Risks to Built Assets

7.12 Assessor information

Table 7.18: Assessor Information

Chapter	Responsibility	Name	Qualifications	Assessor information
Climate Change & GHG Emissions	AES Sustainability Consultants	Ruth Pike – Principal Consultant	BSc Biology with Oceanography	Ruth has 19 years of experience in the sustainability sector of the construction industry. Specialising in energy and sustainability strategies across a wide variety of development types across the UK with specific expertise delivering consultancy within the Greater London Authority area.
		Andrew McManus – Director	BSc Sustainable Technology	Andrew has 16 years experience in the sustainability sector, including post-graduate study in the field of sustainable construction approaches for housing in the UK. He has particular expertise in supporting large scale planning applications and strategic-level sustainability approaches.

Table 7.19: Summary of Effects

Receptor	Receptor Sensitivity	Description of potential impact	Proposed Mitigation	Residual Effect	Significant / Not significant
Construction Phase					
Atmospheric concentration of GHGs - Global climate	High	Embodied carbon 14,200-16,600 tCO ₂ e with embedded timber frame construction (Minor Adverse, not significant)	Timber frame (embedded); WLCA and low-carbon material procurement (additional, recommended)	Minor Adverse (14,200-16,600 tCO ₂ e; potentially reduced toward 10,000-12,000 tCO ₂ e with the recommended additional measures)	Not significant
Atmospheric concentration of GHGs - Global climate	High	Construction traffic and worker travel: approximately 580 tCO ₂ e over the construction period (Minor Adverse, not significant)	CEMP measures (embedded); assumptions to be confirmed with the construction programme	Minor Adverse	Not significant
Construction workers	Medium	Heat stress during extreme temperatures (Moderate level of effect prior to mitigation; significant)	Additional CEMP heat stress protocols	Reduced to Minor	Not significant
Operational Phase					
Atmospheric concentration of GHGs - Global climate	High	Operational energy ~266 tCO ₂ e/yr gross (Minor Adverse with embedded measures; not significant)	ASHP, Significant PV provision, grid decarbonisation	Minor Adverse reducing to Negligible	Not significant
Atmospheric concentration of	High	Transport ~1,600 tCO ₂ e/yr declining under the future baseline of	Travel Plan, EV infrastructure (embedded); car club	Minor Adverse (assessed against the	Not significant

GHGs - Global climate		fleet electrification (Minor Adverse with embedded measures; not significant)	support (additional, not relied upon)	future baseline, with embedded measures)	
Building occupants	Medium	Overheating in future summers (Major level of effect prior to mitigation; significant)	Passive design (embedded); Approved Document O compliance (additional)	Reduced to Minor	Not significant
Occupants and property	Medium	Surface water flood risk (Moderate level of effect prior to mitigation; significant)	SuDS with climate allowances	Reduced to Minor	Not significant
Atmospheric concentration of GHGs - Global climate (whole life)	High	Whole-life GHG inventory: approximately 36,000-38,500 tCO ₂ e over the 60-year assessment period (Minor Adverse, not significant)	Embedded measures across all lifecycle stages, as set out above	Minor Adverse	Not significant

7.12.1 Note: GHG effects are reported using the ISEP five-level significance framework (Major Adverse, Moderate Adverse, Minor Adverse, Negligible, Beneficial); climate risk effects are reported using the level of effect scale (Substantial, Major, Moderate, Minor, Negligible, qualified as adverse or beneficial). The two scales are not interchangeable.

Table 7.20: Summary for Securing Mitigation

Receptor	Type and purpose of measure	Embedded / Additional	Means to secure mitigation	Responsibility
Construction				
Global climate	Timber frame construction	Embedded	Design specification	Applicant
Global climate	Whole Life Carbon Assessment	Additional (recommended)	Planning condition (if imposed)	Applicant
Global climate	Low-carbon material procurement	Additional (recommended)	CEMP / Contractor requirements	Contractor
Workers	Heat stress management	Additional (over and above standard CEMP)	CEMP	Contractor
Operation				
Global climate	Fully electrified heating systems (zero Scope 1)	Embedded	Building Regulations Part L / Condition	Applicant
Global climate	Significant on site PV generation approximately matching regulated energy demand	Embedded	Building Regulations Part L	Applicant
Global climate	Travel Plan implementation	Embedded	S.106 / Condition	Applicant
Global climate	Support for car club and shared mobility services (not relied upon)	Additional	S.106 / Travel Plan	Applicant
Global climate	EV charging infrastructure	Embedded	Building Regulations Part S	Applicant
Occupants	Overheating mitigation	Additional	Building Regulations Part O	Applicant
Property	SuDS with climate allowances	Embedded	Planning condition / LLFA approval	Applicant

7.12.2 Appendix 7.1 (Inter-Related Climate Change Effects) and Appendix 7.2 (Climate Projections and Risk Assessment), together with the associated figures, are issued as separate appendix documents accompanying this chapter.