# 8 CLIMATE CHANGE

## 8.1 Introduction

8.1.1 This chapter of the Environmental Statement (ES) presents the findings of the EIA concerning the potential climate change-related environmental effects of the proposed class B1/B2/B8 business park and associated infrastructure which includes car parking, landscaping, drainage infrastructure, biodiversity provision, footway and cycleway and ancillary works (referred to in this chapter as the 'Proposed Development'). This chapter is submitted in respect of appeal reference CAS-02641-G8G7M5 in September 2024. It addresses the comments made by PEDW in its ES Completeness Report issued in June 2023.

8.1.2 Climate change in the context of EIA can be considered broadly in two parts:

- The potential impact of changes in climate on the Proposed Development, which could affect it directly or could modify its other environmental impacts; and
- The impact of greenhouse gas emissions (GHGs) caused directly or indirectly by the Proposed Development, which contribute to climate change.

8.1.3 This chapter is supported by information contained within the following:

- Appendix 8.1 – Climate Change Risk Assessment; and
- Appendix 8.2 – GHG Emissions Assessment

8.1.4 This assessment is based on the description of the Proposed Development detailed within Chapter 2: Site Description.

## 8.2 Policy, legislation and guidance

### Policy

#### The Paris Agreement

8.2.1 The Paris Agreement is an international treaty on climate change, adopted in 2015 (United Nations, 2015). The UK's nationally determined contribution (HM Government, 2020) under the Paris Agreement to the United Nations Framework Convention on Climate Change, submitted in December 2020, commits the UK to reducing economy wide GHG emissions by at least 68% by 2030, compared to 1990 levels.

#### The Sixth Carbon Budget – The UK's Path to Net Zero

8.2.2 The Sixth Carbon Budget – The UK's Path to Net Zero (CCC, 2020) sets the CCC's recommendations on the Sixth Carbon Budget (2033-37). In the Buildings sector summary, energy efficiency plans to upgrade all buildings to EPC C over the next 10-15 years, increasing the adoption of heat pumps to decarbonise space heating, expanding the role out of low-carbon heat networks and preparation for hydrogen's potential role in heating were highlighted as priorities.

#### Net Zero Wales Carbon Budget 2 (2021-25)

8.2.3 The Welsh Government's plan for meeting the secondary budgetary period is set out in Net Zero Wales Carbon Budget 2 (2021-25) (Welsh Government, 2021). The plan recognises the need to 'outperform' the second carbon budget of 37% average reduction in emissions, as the third carbon budget (2026-2030) requires an average reduction of 58%, reflecting the scale of change that must be made now to ensure this budget is also met. Policy 6 – Planning Policy highlights the role of the planning system in facilitating decarbonisation and sustainable development *"by providing an*

*ambitious and comprehensive policy framework to address the causes and effects of climate change".* Policy 5 – A circular economy, alongside several policies relating to reducing emissions from transport of construction materials (including shipping and zero emission HGVs in policies 33, 40 and 42, and reduction of embodied carbon within construction materials in policy 47) have the overall aim of supporting decarbonisation of the construction and building sector.

### The Energy White Paper: Powering our Net Zero Future

8.2.4 The Energy White Paper (BEIS, 2020) sets out energy-related measures in a long-term strategic vision, working towards the net zero emissions target for 2050, including how emissions from domestic and non-domestic buildings may be eliminated. Key commitments include:

- requiring all rented non-domestic buildings to be EPC Band B by 2030, where cost-effective; and
- deployment of low-carbon heating alternatives, including increasing electric heat pump installation to 600,000 per year by 2028, increasing the proportion of biomethane in the gas grid, evaluating hydrogen as a heating solution, and committing £122 million of funding towards a new Heat Network Transformation Programme.

### The Heat and Buildings Strategy (BEIS, 2021a)

8.2.5 The Heat and Buildings Strategy (BEIS, 2021a) presents ambitions similar to those outlined in the Energy White Paper, setting long-term strategies and setting a minimum efficiency standard of EPC Band B for privately rented commercial buildings in order to significantly reduce emissions by 2030. The Strategy calls for future-proofing new buildings to prepare for a more seamless pathway to Net Zero. In addition to a rapid increase in uptake of low-carbon heat supply, the Strategy sets out how on-site renewable electricity generation can be deployed at small scales to help meet some of the electricity demand of buildings and minimise demand on the electricity grid. On-site energy storage technologies such as batteries and hot water storage are also highlighted as a solution to store energy generated on-site during off-peak periods.

### The Net Zero Strategy: Build Back Greener

8.2.6 The Net Zero Strategy: Build Back Greener (BEIS, 2021b) sets out the UK's long-term plans to meet net zero emissions by 2050 and gives the vision for a decarbonised economy in 2050. The key elements of this vision include low carbon heating and energy efficient buildings as well as supporting the decarbonisation of the construction and building sector. Reporting on embodied carbon in buildings and infrastructure is sought to be improved, alongside reductions in embodied carbon by way of material substitution and resource efficiency. Additionally, the Strategy recognises the importance of addressing 'carbon leakage', whereby reported UK emissions reduce, but global emissions are not reduced due to carbon intensive activities moving overseas, outside of the UK's reporting scope.

### The Industrial Decarbonisation Strategy

8.2.7 The Industrial Decarbonisation Strategy (BEIS, 2021c) sets out the ambition to decarbonise industry, including construction, in line with the UK's 2050 net zero target. The Strategy recognises the fact that the construction sector is one of the biggest purchasers of industrial products, using significant quantities of energy-intensive materials such as steel and concrete. Target areas include improvements in energy and resource efficiency, increased material substitution and supporting circular economy principles within construction, including reuse, repair, recycling and reducing the quantity of materials used within manufacturing. It is noted that 'individual measures with the most potential in reducing emissions are using more construction materials with low embodied carbon (such as timber)' and reusing construction materials.

### Powering Up Britain: The Net Zero Growth Plan

8.2.8 Powering Up Britain: The Net Zero Growth Plan (DESNZ, 2023a) largely restates existing policy, recognising the urgent need to decarbonise the UK's building stock, accelerating the UK's transition to net zero by minimising exposure to volatile fossil fuel prices and bolstering the UK's energy security. Several commitments were reaffirmed within the plan, including:

- reducing total energy consumption from buildings and industry by 15% by 2030;
- achieving installation of 600,000 heat pumps a year by 2028;
- consultation on the Future Buildings Standard in 2023; and
- a decarbonised power system by 2035.

### Progress in reducing emissions: Report to Parliament 2024

8.2.9 Progress in reducing emissions: Report to Parliament (CCC, 2024) provides an update on the UK's emissions reduction progress. It highlights that the UK has achieved its third carbon budget, and thus achieved all three of its carbon budgets to date. However, despite significant reduction in emissions in 2023, the UK is not on track to meet its first target to reduce emissions in 2030 by 68% compared to 1990 levels as its Nationally Determined Contribution (NDC) to the Paris Agreement. The report states that only a third of the emissions reductions required to achieve the 2030 target are currently covered by credible plans, with further action needed across all sectors of the economy.

8.2.10 The report provides key priority recommendations for the UK government to consider in order to accelerate decarbonisation to meet the 2030 net zero target. The following key priorities are relevant to the UK and Welsh government, buildings sector and non-domestic buildings:

- Make electricity cheaper.
- Remove planning barriers for heat pumps.
- Accelerate heat pump roll-out.
- Simplify the strategic decision on the role of hydrogen for heat.
- Develop spatial plans for decarbonising buildings.

### Welsh Government Building regulations

8.2.11 Welsh Government Building regulations with specific relevance to Climate Change include Part L: conservation of fuel and power. Volume 2 of Part L is relevant to non-domestic buildings. The Approved Document Part L Regulations Volume 2 (Welsh Government, 2024a) provides guidance on how to comply with building regulations to make buildings as energy efficient as possible. This is achieved through a focus on minimising heat loss, addressing air leakage, and efficiency of heating and lighting systems.

### Sustainable building standards

8.2.12 Sustainable building standards as part of Building regulations in Wales, identity that for non-residential development, A BREEAM rating or an equivalent quality assured scheme may be required based on building floor area, with the requirements tabulated in **Table 8.1**.

**Table 8.1: Sustainable building standard non-residential policy requirements**

| Building floor area | Policy requirement |
|---|---|
| <=250m$^2$ | Exempt |

| Building floor area | Policy requirement |
|---|---|
| 251 to 1,000m$^2$ | No BREEAM required<br>Part L+10%* required (10% improvement over the Target Emission Rate (TER) for current Part L of the Building Regulations) |
| 1001 to 2,000m$_2$ | BREEAM 'Very Good' with<br>'Excellent' for Energy Credits (ENE01) |
| 2,001+m2 | BREEAM 'Excellent' |

### The Future Homes and Buildings Standards: 2023 Consultation

8.2.13 The Future Homes and Buildings Standards: 2023 Consultation (Department for Levelling Up, Housing & Communities, 2024 sets out proposals for the 2025 Report. It is currently only applicable to England, however, it is of note as it is likely to be adopted by Wales at a later date. Regarding new buildings, the consultation sets out performance requirements to ensure non-domestic buildings "have high fabric standards, use low-carbon heating and are 'zero-carbon ready' (meaning no further work will be needed for them to have zero carbon emissions once the electricity grid has fully decarbonised)"', while presenting options 'to reduce running costs, while maintaining thermal comfort, balanced against build costs'. Updates to previous consultations also includes guidance on building fabric and fixed building services for on-site electricity generation and improving the guidance and minimum standards for heat losses, directly supporting the installation of 'zero-carbon ready' technology. Additionally, the consultation supports the expansion of cleaner heat networks. 'New homes and non-domestic buildings can be connected to existing heat networks, but they should uphold the performance requirements outlined in this consultation'.

### The Net Zero Carbon Building Standard

8.2.14 The Net Zero Carbon Building Standard will provide a consistent approach to assessing whether a building can be defined as 'Net Zero Carbon'. It would apply to new buildings, existing buildings and retrofits. Limits for embodied carbon and operational energy would be set based on their allocated share of the whole-life carbon budget, and the renewable energy budget, for the built environment. The Standard would set science-based limits and targets in line with what the latest climate science deems necessary to meet the goals of the Paris Agreement. A version of the standard for Beta Testing is expected to be published by the end of 2024.

## Legislation

### The Climate Change Act 2008

8.2.15 The Climate Change Act 2008 commits the UK government to reducing greenhouse gas emissions by 100% of 1990 levels by 2050 and creates a framework for setting a series of interim national carbon budgets and plans for national adaptation to climate risks. The Act requires the UK government to set carbon budgets for the whole of the UK. A carbon budget places restrictions on the total amount of GHGs that can be emitted. The budget balances the input of $CO_2$ to the atmosphere by emissions from human activities, by the storage of carbon (i.e. in carbon reservoirs on land or in the ocean). At present the Fourth, Fifth and Sixth Carbon Budgets, set through The Carbon Budget Orders 2009, 2011, 2016 and 2021 are 1.95 $GtCO_2e$ for 2023-2027, 1.73 $GtCO_2e$ for 2028-2032 and 0.97 $GtCO_2e$ for 2033-2037 respectively. The Sixth Carbon Budget is designed to be consistent with the UK's net zero target, requiring a 78% reduction in GHG emissions by 2035 from 1990 levels. The Climate Change Act 2008 also created the Committee on Climate Change (now Climate Change Committee (CCC)) to give advice on carbon budgets and report on progress. The Committee through its Adaptation Sub-Committee also gives advice on climate change risks and adaptation. Although not itself setting government policy, the Climate Change Committee's statutory role to advise government under the Climate Change Act 2008 means that its recommendations or identification of policy gaps are relevant to consider in this assessment.

### The Environment (Wales) Act (2016)

8.2.16 The Environment (Wales) Act (2016) provides Welsh ministers with powers to put in place statutory emissions reduction targets, including an aspiration to achieve net zero GHG emissions by 2050 and also presents the requirement to set carbon budgets.

### The Climate Change (Carbon Budgets) (Wales) (Amendment) Regulations 2021

8.2.17 The Climate Change (Carbon Budgets) (Wales) (Amendment) Regulations 2021 regulates two carbon budgetary periods as established in the Environment (Wales) Act (2016). The period of 2021-2025 limits GHG emissions to an average of 37% lower than the 1990 baseline (this is updated from 33% as stated within the 2018 Regulations), and the period of 2026-2030 limits GHG emissions to an average of 58% lower than the baseline.

### The Well-being of Future Generations (Wales) Act 2015

8.2.18 The Well-being of Future Generations (Wales) Act 2015 outlines seven well-being goals for a future Wales, built around sustainable development principles. This ensures that, in assessing current proposed developments, the needs of the present are met without compromising the needs of future generations. The Act states that in considering proposed developments, public bodies must take into account all seven well-being goals, which include the ambition to reach a "low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately (including acting on climate change)" (from 'a Prosperous Wales' goal).

## National Planning Policy Context

### Planning Policy Wales

8.2.19 Planning Policy Wales (Welsh Government, 2024b) states the importance of reducing the vulnerability to and adapting to climate change, which is highlighted in the following sections:

- Paragraph 3.30 of Section 3: Strategic and Spatial Choices states that "planning system plays a key role in tackling the climate emergency through the decarbonisation of the energy system and the sustainable management of natural resources". This section also highlights that climate change will produce "impacts felt at the local level presenting a significant risk to people, property, infrastructure and natural resources".
- Paragraph 5.7.13 states that the Welsh Government expects all new developments to mitigate "the causes of climate change in accordance with the energy hierarchy for planning. Reducing energy demand and increasing energy efficiency, through the location and design of new development, will assist in meeting energy demand with renewable and low carbon sources."
- Section 5.8: Sets out that sustainable building design principles should be integral to the design of development proposals and should "mitigate the causes of climate change, by minimising carbon and other greenhouse gas emissions associated with the development's location, design, construction, use and eventual demolition". Furthermore, buildings should include features for the "adaptation to, and resilience against, the current and predicted future effects of climate change". Developers should consider future requirements for carbon reduction in new buildings when designing schemes as a result of changes to Building Regulations.
- Section 6.9: Unlocking Potential by Taking a De-risking Approach mentions that impacts of climate change should be taken into account at all stages of the planning process.

### Future Wales: The National Plan 2040

8.2.20 Future Wales: The National Plan 2040 (Welsh Government, 2021a) sets out the direction for development in Wales to 2040, including key national priorities such as achieving decarbonisation and climate-resilience. This plan addresses the climate emergency and shows strong support for a low carbon economy, in particular highlighting the role of heat networks and the importance of supporting renewable and low carbon energy projects.

## Local Planning Policy Context

### Vale of Glamorgan Local Development Plan (2017)

8.2.21 Vale of Glamorgan Local Development Plan (2017) states its objective of ensuring that *"development within the Vale of Glamorgan makes a positive contribution towards reducing the impact of and mitigating the adverse effects of climate change".* Policy MD2, 'Design of New Development', states that development proposals should mitigate the causes of climate change by minimising greenhouse gas emissions associated with their design construction, use and eventual demolition. They should also include effective adaptation to and resilience against, the current and predicted effects of climate change.

### Vale of Glamorgan Council Climate Change Challenge Plan 2021-2030

8.2.22 Vale of Glamorgan Council Climate Change Challenge Plan 2021-2030 sets out a framework for achieving the council's commitment of becoming carbon neutral by 2030. It highlights their aims to work with developers to develop zero carbon buildings, create more energy efficient buildings and to require all new and significant developments to implement appropriate sustainable drainage system (SuDS) to appropriately manage surface water, water quantity and biodiversity.

## Relevant Guidance

8.2.23 The main guidance document with regard to climate change risk assessment within the context of EIA is the Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation (IEMA, 2020).

8.2.24 The main guidance used for the assessment of GHG emissions in EIA is the Institute of Environmental Management and Assessment (IEMA) guide 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2022).

8.2.25 Additional guidance used for the quantification of GHG emissions includes:

- the Greenhouse Gas Protocol suite of documents (World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD), Revised Edition 2004).

# 8.3 Consultation

8.3.1 An ES dated July 2019 was prepared in support of the planning application for the Proposed Development. Upon examination by Planning & Environment Decisions Wales (PEDW), PEDW formally requested further information under Regulation 24 of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (as amended). The following response was provided in regard to climate change:

8.3.2 *"It is not considered climate change has been meaningfully addressed within the ES. Further information is therefore required in respect of the proposed developments likely effects in respect of climate change, as referred to Schedule 4 of the Regs, either as a separate topic area or as integral elements to the various chapters".*

8.3.3 This Climate Change chapter has been developed in response to the above comment in that the Proposed Developments likely effects are considered in respect of climate change at this outline design stage.

## 8.4 Assessment Methodology

### Climate Change Risk Assessment

8.4.1 The Climate Change Risk Assessment (CCRA) considers climate projections at the Site for the period 2070-2099 against the 1981-2010 baseline. These projections use the latest available UK climate projections from the Met Office Hadley Centre's UK Climate Projections 2018 (UKCP18) probabilistic projections. A precautionary approach is used for the climate projections which consider a high emissions scenario, the Representative Concentration Pathway (RCP) 8.5 scenario. This scenario assumes a future where global emissions continue to rise unmitigated. The 50th percentile has been selected which represents an 'as likely as not'[1] probability of change, in addition to the 10th and 90th percentiles, which represent lower and higher extreme values.

8.4.2 Further detail on the CCRA methodology is described in Appendix 8.1. Whilst the CCRA touches on flood risk, it has been addressed in further detail within the Sustainable Drainage Assessment (RPS, 2019).

### Study Area

8.4.3 The climate change risk study area is the climate projections 25 km grid cell, from the Met Office UKCP18 probabilistic projections, in which the Site is located.

8.4.4 The assessment will consider activities associated with the operational phase of the Proposed Development. Activities during the construction and decommissioning phase is not considered in the assessment as the climate is unlikely to experience significant changes compared to the current baseline during construction due to the likely short duration.

### Baseline

8.4.5 With regard to the current climate, the baseline is the local and regional climate and resulting weather patterns recorded in Met Office observational data. The future climate baseline has been informed by the Met Office UKCP18 tool and its probabilistic projections which consider future temperature and precipitation trends.

### Assessment Criteria and Assignment of Significance

8.4.6 Risks associated with climate change were identified using the current and future climate baseline for the Site location. The risk assessment and determination of significance considers the vulnerability and exposure of the Site to climate hazards.

8.4.7 Risk in the context of climate risks to buildings is defined as the risk that a weather or climate event occurs and results in an adverse impact. Impacts due to weather and climate typically take two forms: sudden-onset (acute) or slow-onset due to cumulative events over time (chronic). For example:

- Risk of sudden-onset damage to an asset following an extreme weather-related event such as surface water flooding.

[1] The 50th percentile is the median line in a probability bell curve of assembled climate model projection data, and as such, represents the point at which that likely climate outcomes will lie on one side of this median line as the other side, hence the term 'as likely as not'.

- Risk that asset condition deteriorates below acceptable standards following years of changing seasonal weather.

8.4.8 Given the variability in the nature of the potential effects of climate change, receptors have been identified on a risk-specific basis, whereby all receptors relate to the long-term use of residential housing and the safety and comfort of occupants. To classify each risk, relevant climate hazards were identified using the obtained climate projections with consideration for exposure and vulnerability.

8.4.9 The relationship between exposure and vulnerability is the defining factor to overall significance. A location can be exposed to a certain hazard but may not be vulnerable. Vulnerability can also be considered alongside coping capacity, or lack thereof. The combination of the two, with the identified exposure will be used to assign a significance rating. Table 8.2 outlines definitions for hazard, exposure and vulnerability and Table 8.3 outlines the significance matrix that is used to define the overall risk of a climate hazard on specific receptors.

**Table 8.2: Climate Change Risk Assessment scoring definitions**

| Factor | Score definitions |
|---|---|
| **Hazard:** refers to the possible, future occurrence of natural or human physical events that may have adverse effects on vulnerable and exposed elements. The presence of a hazard is identified and weighted based on the location's exposure to that hazard. For example, a hazard may occur within a particular scenario, however the relative exposure to that hazard is how it will be measured. | |
| **Exposure:** considers the nature of the impacts and the degree of certainty based on the obtained climate projections. Exposure is necessary, but not determinant of risk. A site can be exposed but not vulnerable. | **Major:** large change to climate condition and large increase in the frequency of the event. |
| | **Moderate:** a large, measurable change in climate conditions at a regular frequency. |
| | **Minor:** change in climate conditions that may have measurable effect on a receptor, but which are low likelihood of occurring or infrequent. |
| **Vulnerability:** the degree of vulnerability of each receptor to the hazard. Vulnerability can be seen as situation specific. | **High:** short term, acute impact to functionality or a large, measurable decrease in receptor lifespan following the occurrence of a climate impact. Major increase in the need for maintenance and repairs. |
| | **Medium:** measurable decrease in receptor performance or lifespan or increase in necessary maintenance and repairs following the occurrence of a climate impact. |
| | **Low:** small measurable impact to a receptor's performance following climate impact, or deterioration of a receptors. Lifespan due to a chronic effect. |

**Table 8.3: Climate Change Risk Assessment significance matrix**

| | | Exposure | | |
|---|---|---|---|---|
| | | **Major** | **Moderate** | **Minor** |
| **Vulnerability** | **High** | Significant | Significant | Significant |
| | **Medium** | Significant | Significant | Not Significant |
| | **Low** | Significant | Not Significant | Not Significant |

## Assumptions and Limitations

8.4.10 When assessing the impacts of climate change on the Proposed Development, uncertainty arises from both modelling uncertainty and natural variability in the potential magnitude of future changes in climate. Therefore, a high magnitude of change scenario (RCP8.5) and a range of percentiles for

the probabilistic projections have been used, to provide a precautionary approach. This is further discussed in Appendix 8.1: Climate Change Risk Assessment.

## GHG Emissions Assessment

8.4.11 GHGs considered in this assessment are those in the 'Kyoto basket' of global warming gases expressed as their $CO_2$-equivalent ($CO2_e$) global warming potential (GWP). GWPs used are typically the 100-year factors in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (Forster et al, 2007) or as otherwise defined for national reporting under the United Nations Framework Convention on Climate Change (UNFCCC).

8.4.12 GHG emissions caused by an activity are often categorised into 'Scope 1', 'Scope 2' or 'Scope 3' emissions, following the guidance of the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol suite of guidance documents (WRI and WBSCD, 2004).

- Scope 1 emissions: released directly by the entity being assessed, e.g. from combustion of fuel at an installation.
- Scope 2 emissions: caused indirectly by consumption of imported energy, e.g. from generating electricity supplied through the national grid to an installation.
- Scope 3 emissions: caused indirectly in the wider supply chain, e.g. in the upstream extraction, processing and transport of materials consumed or the downstream disposal of waste products from an installation.

8.4.13 This assessment has sought to include emissions from all three scopes, where this is material and reasonably possible from the information and emissions factors available, to capture the impacts attributable most completely to the Proposed Development. Although, it should be noted that emissions have not been broken down into scopes in the assessment as it is more useful to assess emissions when categorised into activities that result in emissions.

8.4.14 Some construction-stage GHG emissions associated with the manufacturing of components may occur outside the territorial boundary of the UK and hence outside the scope of the UK's national carbon budget. However, in recognition of the climate change effect of GHG emissions (wherever occurring) and the need, as identified in national policy, to avoid 'carbon leakage' overseas when reducing UK emissions, the full life-cycle GHG emissions of the Proposed Development, including construction-stage emissions, have been evaluated where possible when determining the significance of effects.

8.4.15 As the Proposed Development is currently in the outline stage of the design process, a detailed bill of quantities is not yet available until a future Reserved Matters application is submitted. Therefore, in its absence, a high-level benchmark approach using published benchmarks is used for the GHG emissions assessment.

8.4.16 A high-level benchmark approach involves obtaining benchmark intensities that are the most relevant to activities as a consequence of the Proposed Development and applying these intensities to a given level of activity or materials to estimate embodied and operational GHG emissions. The following sources were relied upon for the assessment:

- Chartered Institution of Building Services Engineers (CIBSE) Guide F Energy Efficiency in Buildings: 'Good Practice' electricity and fossil fuel consumption intensities. (CIBSE, 2012).
- Royal Institution of Chartered Surveyors (RICS) Standard IP32/2012 (RICS, 2012).
- OneClick Life Cycle Analysis (LCA) Carbon Heroes Benchmark (OneClick LCA, 2023).
- Inventory of Carbon and Energy (ICE) database (Hammond and Jones, 2019).

8.4.17 While the Proposed Development includes several features to be constructed, only the B1/B2/B8 business park and car park will be quantified in the GHG assessment. This is because estimated

floor area is only available for these two elements and because it is anticipated that the business park and construction of the car park will represent the most carbon intensive activities within the scheme. The remaining elements not quantified are unlikely to result in a material increase in emissions.

8.4.18 Further detail on the GHG assessment methodology is described in Appendix 8.2.

## Study Area

8.4.19 GHG emissions have a global effect rather than directly affecting any specific local receptor. The assessment on climate change will therefore focus on the impact of GHG emissions on the global climate and be considered in the context of Government projections consistent with national carbon budget commitments.

## Baseline

8.4.20 The current and future baseline conditions relevant to the Proposed Development with regards to the impact of GHGs comprise the following:

- any existing GHG sources or sinks from current land use; and
- the current and future baseline for electricity and natural gas intensity, established through the use of published benchmarks.

## Assessment Criteria and Assignment of Significance

### Receptor Sensitivity

8.4.21 The climate change assessment considers a single sensitive receptor. The sensitive receptor is defined as the global atmospheric concentration of GHGs and it is characterised as having a 'high' sensitivity, given the severe consequences of climate change and cumulative contributions of other sources. GHG emissions have a global effect rather than directly affecting specific local receptors to which levels of sensitivity can be assigned. The global atmospheric concentration of the relevant GHGs, expressed in $CO_2$-equivalents ($CO_2e$), is therefore be treated as a single receptor of high sensitivity (given the severe consequences of climate change).

### Magnitude of Impact

8.4.22 As GHG emissions can be quantified directly and expressed based on their GWP as tonnes of $CO_2e$ ($tCO_2e$) emitted, the magnitude of impact of the assessment of effects on climate change is reported numerically. Where a quantifiable figure is not possible this is expressed qualitatively.

### Significance of Effects

8.4.23 Assessment guidance for GHG emissions (IEMA, 2022) describes five levels of significance for emissions resulting from a development, each based on how a proposed development contributes towards achieving net zero by 2050. To aid in considering whether effects are significant, the guidance recommends that resultant GHG emissions should be contextualised against pre-determined carbon budgets, or emerging policy and performance standards where a budget is not available. It is a matter of professional judgement to integrate these sources of evidence and evaluate them in the context of significance.

8.4.24 Taking the guidance into account, the following factors have been considered in contextualising the Proposed Development's GHG emissions:

- The magnitude of gross and net GHG emissions as a percentage of national and local carbon budgets (where feasible);
- The consideration of any increase/reduction in absolute GHG emissions in connection with the Proposed Development compared with current baseline scenarios, including projections for future changes in those baselines; and
- Whether the Proposed Development contributes to, and is in line with, the UK's policy for GHG emissions reductions, where these are consistent with science-based commitments to limit global climate change to an internationally agreed level (as determined by the UK's NDC to the Paris Agreement (HM Government, 2020)[i].

8.4.25 Effects from GHG emissions are described within this chapter as adverse, negligible or beneficial based on the definitions presented in Table 8.4, as stated within the IEMA guidance (IEMA, 2022).

**Table 8.4: GHG assessment significance criteria and definitions**

| Significance Criteria | Definition |
|---|---|
| Major Adverse | The Proposed Development's GHG impacts would not be compatible with the UK's net zero trajectory. Its GHG impacts would not be mitigated or would be compliant only with do-minimum standards set through regulation. The Proposed Development may not provide further emissions reductions required by existing local and national policy for projects of this type. |
| Moderate Adverse | The Proposed Development's GHG impacts would not be compatible with the UK's net zero trajectory. Its GHG impacts would be partially mitigated and may partially meet the applicable existing and emerging policy requirements, however it would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. |
| Minor Adverse | The Proposed Development's GHG impacts would be compatible with the UK's 1.5°C trajectory and would comply with up-to-date policy and 'good practice' emissions reduction measures. The Proposed Development would fully comply with, or exceed, measures necessary to achieve the UK's net zero trajectory. |
| Negligible | The Proposed Development would achieve emissions mitigation that goes substantially beyond existing and emerging policy compatible with the 1.5°C trajectory and would have minimal emissions. The Proposed Development would be fully consistent with good practice design standards for projects of this type. |
| Beneficial | The Proposed Development would result in emissions reductions from the atmosphere, whether directly or indirectly, compared to the without-project baseline. As such, its net GHG impacts would be below zero. The Proposed Development would substantially exceed net zero requirements. |

8.4.26 Major and moderate adverse effects are both identified to be 'significant', and professional judgement is applied to differentiate between the 'level' of significant adverse effects. Beneficial effects are also considered to be significant. Minor adverse and negligible effects are not considered to be significant.

## Assumptions and Limitations of the Assessment

8.4.27 The application for the Proposed Development is in outline only. As such, there is limited site-specific detail available for assessment of impacts. The assessment has therefore used broad and conservative assumptions to estimate the magnitude of GHG emission impacts for the Proposed Development.

8.4.28 Published benchmarks have been used to estimate possible emissions from the Proposed Development. Such benchmarks are not always directly comparable, owing to differences in scope, assumptions and energy mix for example. Furthermore, there is substantial variation in building design, materials choice and hence embodied carbon. The estimated impact of the Proposed Development on climate change during construction is not precise but is sufficient to identify the

potential for any significant adverse effect prior to any further mitigation measures being employed at the detailed design stages.

8.4.29 Embodied carbon benchmarks sourced from RICS Standard IP32/2012 information paper (RICS, 2012) is used to calculate construction stage emissions associated with the proposed class B1/B2/B8 business park. It is acknowledged that the design and equipment available in the present day compared with pre-2012 is significantly different. Where available, more up-to-date benchmark sources, including OneClick LCA Carbon Heroes (2023) have been used, which utilise published data from carbon assessments of built assets. These benchmarks have been used where available, but to ensure a conservative assessment, the RICS (2012) benchmarks have also been used, providing a range of construction emission values.

8.4.30 Published benchmarks are not available for all elements of the Proposed Development. Where published benchmarks and detailed design information for the Proposed Development is not available, impacts will be assessed qualitatively. This approach is sufficient to identify the potential of any significant adverse effect prior to further mitigation measures being employed at the detailed design stages. Further, the majority of emissions from the Proposed Development are likely to result from elements which have published benchmarks available (i.e. business park). At the current design-stage of the Proposed Development, only the total Gross External Area (GEA) is known for each use class of the proposed business park and an estimated area for the proposed car park. As no detailed drawings are available at this stage, the use class types and areas are approximate and are subject to change during the design of the Proposed Development.

8.4.31 As the RICS (2012) benchmarks are based on Gross Internal Area (GIA), there will be an overestimation in calculated emissions as the benchmarks have been scaled with the GEA for the Proposed Development, which results in higher emissions than using GIA.

8.4.32 The GHG effects of supporting infrastructure elements will be assessed in detail at the reserved matters stage of the application

8.4.33 As no energy strategy is available at this stage, operational emissions are calculated using CIBSE Guide F benchmarks (CIBSE, 2012) which only covers regulated energy consumption (consisting of regulated components such as heating, cooling, hot water and lighting) and as such, does not account for unregulated energy consumption (consisting of unregulated components such as IT equipment). As detailed building specifications are not available at this stage of the design, the calculated operational GHG emissions using CIBSE Guide F benchmarks may not accurately represent the Proposed Development's operational energy consumption.

8.4.34 The Proposed Development is assumed to predominantly be an office, industrial and warehouse use development. Three benchmark categories were chosen which are relevant to the use classes of the proposed business park with associated fossil fuel and electricity intensities. The assessment uses CIBSE Guide F 'Good Practice' electricity and fossil fuel benchmarks which consider the upper limits of newer design. The CIBSE Guide F benchmark categories used are as follows:

- industrial buildings (good practice fossil fuels intensities).
- offices (good practice fossil fuels and electricity intensities).
- warehouses (good practice fossil fuels and electricity intensities).

8.4.35 As CIBSE Guide F does not provide benchmarks for electricity consumption for industrial buildings, which applies to use class B2 from the proposed business park, CIBSE Guide F benchmarks for offices is used instead as this is considered to closely represent associated energy consumption and is a more conservative intensity compared to that of the warehouses benchmark electricity intensity.

8.4.36 It is assumed that construction would begin in 2026 with first year of operation from 2027, as such, operational GHG emissions will assume the Proposed Development is complete from its first year of operation. However, as delivery of the Proposed Development is anticipated to be phased, it is likely that this will overestimate operational GHG emissions.

8.4.37 For the purposes of the operational transport emissions assessment, it has been assumed that all trips generated from the Proposed Development were additional to the baseline and have not been relocated from elsewhere. This is likely to lead to an overestimate of emissions, as many of these trips would have occurred in the absence of the Proposed Development. Nevertheless, to ensure a robust assessment, and to contextualise emissions within both national and local carbon budgets, this approach has been taken.

8.4.38 The above uncertainties are integral to the assessment of climate change effects, but a conservative approach has been taken as far as practicable to provide a reasonable worst-case assessment. As such, it is considered that limitations to the assessment have been minimised and that the results provide a robust estimate of the effects of the Proposed Development.

## 8.5 Baseline Environment

### Climate Change Risk Assessment

#### Current Baseline Conditions

8.5.1 The baseline climate data has been sourced from the Met Office climate station located in St-Athan (Vale of Glamorgan) (Met Office, 2024) as it is the closest located climate station to the Proposed Development and provides records of observed climate averages covering the climate period 1981-2010 and reviewed alongside regional observational data averaged over the same period (Met Office, 2020). Observational climate averages data for the Site shows:

- highest monthly average maximum temperature is in July at 20.1°C. This is higher compared to regional and national figures in July (20.01°C for Southwest England and South Wales, and 19.45°C for the UK).
- lowest monthly average minimum temperature is in February at 2.38°C. This is higher compared to regional and national figures in February (1.69°C for Southwest England and South Wales, and 0.72°C for the UK).
- wettest month is October, with average rainfall of 122.41 mm. This is lower than the regional and national figures (145.39 mm and 125.65 mm in October). Annual average precipitation is 998.90 mm, lower than the regional figure of 1,304.57 mm for Southwest England and South Wales and higher than the UK annual average precipitation of 931.13 mm.
- 136 days of rain (>1 mm falling in a day) are experienced on average every year, lower than regional (167) and UK (156) averages.

8.5.2 Overall, the Proposed Development is located in an area that is warmer and drier than the wider region (Southwest England and South Wales). The area is also warmer and wetter than the UK as a whole. Further detail can be found in Appendix 8.1.

#### Future Baseline Conditions

8.5.3 The UKCP18 probabilistic projections using the emissions pathway RCP8.5, as a precautionary approach, for the period 2070-2099 against the 1981-2010 baseline shows:

- precipitation is projected to decrease by up to 24.3% during the driest season (Spring) and increase by up to 38.57% in the wettest season (Autumn).
- in the driest month (April), precipitation is projected to decrease by up to 30.66%, whilst in the wettest month (December), precipitation is projected to increase by up to 63.99%.
- the annual average temperature is projected to increase by 3.63°C, with the maximum temperature in the hottest month (July) projected to increase by up to 10.89°C. The minimum temperature in the coldest month (February) could also increase by up to 5.52°C.

8.5.4 Overall, the Proposed Development is located in an area that is projected to show increased variation in precipitation trends, leading to greater seasonal extremes and an increase in temperature across the year by the end of the century.

8.5.5 Further detail can be found in Appendix 8.1.

### GHG Emissions Assessment

#### Current Baseline Conditions

8.5.6 The current baseline is the Site's current use. The Site is predominantly agricultural land of moderate to poor quality with arable pasture fields bounded by low hedgerows with occasional hedgerow trees. It is considered therefore that there are limited GHG emissions associated with the current use of the Site.

#### Future Baseline Conditions

8.5.7 The future baseline trend is towards the decarbonisation of the built environment. This is based within the context of the 'climate emergency' as declared by the Welsh Government and subsequently by the Vale of Glamorgan Council in 2019, and the reaffirmed commitments to the Paris Agreement targets within the recent Conference of Parties (COP27). Further, under the Climate Change Act 2008 (as amended 2019), the UK is committed to achieving net zero emissions nationally by 2050.

8.5.8 The future baseline encompasses changes in the baseline carbon intensity of factors such as electricity, heating, fuel, transport fuel or energy and the embodied carbon in construction materials. All of these are expected to decrease over time in line with national decarbonisation policy goals. For the purpose of this assessment, present-day values have been used (appropriately representative of the construction period and initial year of operation) to be conservative, but it is noted that notwithstanding the specific mitigation for the Proposed Development, its operational emissions from energy consumption are likely to decrease during its lifetime due to the decarbonisation of the electricity grid.

8.5.9 The future baseline GHG emissions for the agricultural land without the Proposed Development are expected to remain similar.

## 8.6 Embedded Mitigation Measures

### Climate Change Risk Assessment

#### Construction

8.6.1 The Proposed Development is unlikely to experience significant changes in climate as construction would be anticipated to begin in 2026 and assumed to become operational from 2027, therefore climate conditions will be similar to the current baseline. To mitigate potential risks, good working practices will be defined through a Construction Environmental Management Plan (CEMP) which includes:

- monitoring weather reports from the Met Office for severe weather warnings such as flood risk.
- safe access routes that can be used during severe weather events.
- provide clothing suitable for working in high temperatures.
- welfare facilities and hydration stations on Site.

## Operation

8.6.2 The Sustainable Drainage Assessment (RPS, 2019) outlines measures to mitigate flood risk, such as permeable parking bays and rainwater harvesting units included in the design to manage surface water runoff. Attenuation structures are also included in the design and will be sized to store runoff from 1 in 100 annual probability rainfall events including a 30% climate change uplift.

8.6.3 Buildings will be designed with adequate ventilation to mitigate the risk of increased temperatures causing overheating of buildings and risk of damage to building fabrics due to water ingress.

8.6.4 Green infrastructure has been designed into the Proposed Development through the incorporation of semi-natural features and provision of new greenspace in a network of connected features. This provides mitigation benefits through reduced localised ambient temperatures to reduce the risk of overheating in buildings and mitigation of flood risk. The following green infrastructure is proposed:

- Protection of Whitelands Brook corridor adjoining the eastern site boundary.
- Provision of functional greenspace of biodiversity value as part of the proposed Sustainable Drainage System (SuDS) scheme (swales, attenuation areas and ditches).
- The proposed SuDS scheme will provide an east-west corridor along the southern boundary of the site, connected to the Whitelands Brook.
- Incorporation of much of the existing hedgerow network and landscape buffers into the Scheme layout.
- Offsite native woodland and scrub planting immediately to the south of the application site.

8.6.5 All buildings will be built in line with current building regulations for structural design with safety margin using durable materials. This will mitigate the risk of damage to buildings from increased frequency and intensity of extreme weather events and the increased risk of subsidence due to increased variability in seasonal precipitation i.e. drier summers and wetter winters.

# GHG Emissions Assessment

## Construction

8.6.6 Prior to commencement of construction, good working practices will be defined through a Construction Environmental Management Plan (CEMP) for the Proposed Development.

8.6.7 Mitigation measures, as part of the CEMP, would be adopted to minimise GHG emissions generated as a result of activities related to the construction of the Proposed Development. Measures include:

- where practicable, prefabricated elements would be delivered to the site ready for assembly, which will reduce on-site construction waste and reduce vehicle movements as part of the construction process.
- construction materials should be sourced locally where practicable, to minimise the impact of transportation.
- vehicles used in road deliveries of materials, equipment and waste arisings on- and off-site would be loaded to full capacity to minimise the number of journeys associated with the transport of these items.
- all machinery and plant would be procured to adhere with emissions standards prevailing at the time and should be maintained in good repair to remain fuel efficient.
- when not in use, vehicles and plant machinery involved in site operations would be switched off to further reduce fuel consumption.
- where possible, local waste management facilities would be used to dispose of all waste arisings, to reduce distant travelled and associated emissions.

- the volume of waste generated would be minimised, and resource efficiency maximised, by applying the principles of the waste hierarchy throughout the construction period. Segregated waste storage should be employed to maximise recycling potential for materials; and
- equipment and machinery requiring electricity would only be switched on when required for use. Procedures should be implemented to ensure that staff adhere to good energy management practices, e.g. through turning off lights, computers and heating/air conditioning units when leaving buildings.

8.6.8 Further measures to mitigate GHG emissions arising from construction activities will be investigated and considered where practicable and viable at the Reserved Matters application. These are described in Section 8.9.

### Operation

8.6.9 The following mitigation measures have been adopted at this outline design stage to reduce GHG emissions associated with transport generated as a result of activities related to the operation of the Proposed Development. Measures include:

- delivery of a Travel Plan which will promote sustainable travel;
- the application of a Car Parking Management Plan which will limit the provision of parking for staff at the Site to promote active travel modes of transport;
- provision of a footway and shared use foot and cycle way to promote sustainable transport modes;
- provision of a spine road that enables public transport penetration which promotes use of buses to and from the Site; and
- bus stops to enable public transport to penetrate the Site, reducing the need for private vehicles to access the Site.

8.6.10 Further measures to mitigate GHG emissions arising from operational activities will be investigated and considered where practicable and viable at the Reserved Matters application. These are described in Section 8.9.

### Land Use

8.6.11 As part of landscaping works, the Proposed Development will retain existing green infrastructure and adopt additional new green infrastructure and open space across the Site. This will consist of extensive new native planting which includes a new belt of native woodland along the eastern boundary, southern boundary and southwest corner, new scrub planting and new rough grassland. While there will be some loss of vegetation to accommodate the Proposed Development, the loss will be mitigated by the introduction of extensive areas of new native planting.

8.6.12 The proposed planting strategy may provide carbon sequestration benefits to offset GHG emissions generated as a result of construction and operational activities. However, at this outline design stage, detailed information on extent of, and species of planting, are not available and therefore carbon sequestration benefits cannot be quantified.

## 8.7 Assessment of Construction Effects

### Climate Change Risk Assessment

8.7.1 The Proposed Development is unlikely to experience significant changes in climate during construction due to the short-duration of the phases and as construction would be anticipated to begin in 2026, climate conditions during construction will be similar to the current baseline. Therefore, good working practices defined through a Construction Environmental Management Plan

(CEMP), such as those detailed in section 8.6, would mitigate risks such as heat illness to workers during construction. Therefore, there are no significant effects during the construction phase of the Proposed Development.

## GHG Emissions Assessment

### Magnitude of Impact

#### Proposed business park and car park

8.7.2 The manufacturing of associated materials and construction of the Proposed Development would result in both direct and indirect GHG emissions.

8.7.3 The majority of the construction-stage impacts are associated with the supply chain emissions resulting from the extraction of raw materials and manufacturing of construction materials, alongside the emissions associated with their transportation to the Site.

8.7.4 At this outline design stage, the exact material requirements for the Proposed Development are not defined in detail. As such, it is not possible to calculate project-specific embodied carbon or direct construction stage GHG emissions. Instead, published benchmarks have been used to estimate possible emissions from the Proposed Development. The benchmark data is expressed in $kgCO_2e/m^2$ of floor area.

8.7.5 Three sources of benchmark data have been considered for the assessment of construction effects. Each benchmark source includes consideration of different LCA stages within their benchmark intensities. Therefore, to ensure each benchmark used covers the entire embodied emissions stages (A1 ('product' stage) - A5 ('construction' stage)), varying levels of uplifts have been applied to the benchmark intensities. The benchmark sources and applied uplift are as follows:

- 'Business Park' category published in the RICS Standard IP32/2012 information paper (RICS, 2012) with an uplift of 12.9% to intensities;
- UK-specific benchmarks contained within the Carbon Heroes Benchmarking Database, produced by OneClick LCA (OneClick LCA, 2023) with an uplift of 3.6% to intensities; and
- benchmark intensity for asphalt (for the proposed car park) from the Inventory of Carbon and Energy (ICE) database v3 (Hammond and Jones, 2019) with an uplift of 12.9% to intensities.

8.7.6 While RICS (2012) have benchmark categories that are relevant to specific use classes for the proposed business park, the 'business park' benchmark intensity provides a conservative estimate that captures the entire proposed business park element at a high-level. With an uplift of 12.9%, to capture stages A1-A5, the resultant construction emission intensity is 971 $kgCO_2e/m^2$.

8.7.7 Total floor areas were scaled by relevant benchmarks to calculate construction stage emissions for the proposed business park with consideration of both the original 2019 GEA assumptions and current 2024 GEA assumptions (based on current market demand). This allows for comparison of emissions between both scenarios. Total floor area with an assumed asphalt depth was scaled by relevant benchmarks to calculate construction stage emissions for the proposed car park. The calculated emissions are summarised within Table 8.5. The greater benchmark value (RICS, 2012) for the proposed business park, aligning with a conservative assessment approach, has been used to inform the assessment of significance for both the original 2019 GEA assumptions and current 2024 GEA assumptions.

8.7.8 The methodology and further detail concerning the quantification of construction stage impacts can be found in Appendix 8.2: GHG Emissions Assessment.

**Table 8.5: Total construction stage emissions**

| Element | Total Construction Emissions ($tCO_2e$) | |
|---|---|---|
| | 2019 GEA assumption | 2024 GEA assumption |
| Business Park (RICS) | 153,350 | 122,671 |
| Business Park (OneClick LCA Carbon Heroes) | 96,237 | 71,586 |
| Car Park (ICE Database) | 5,487 | 5,487 |
| **Total Business Park (RICS) and Car Park (ICE Database) construction stage emissions** | **158,837** | **128,158** |

8.7.9 As detailed in Table 8.5, construction stage emissions considered for magnitude of impact using the current 2024 GEA assumptions is 128,158 $tCO_2e$. This is a decrease of 30,679 $tCO_2e$ compared to the original 2019 GEA assumptions.

8.7.10 Elements of construction traffic are built into the assessment of the construction of the Proposed Development as they are accounted for within the benchmark data used. Therefore, construction transport has not been considered further.

8.7.11 Construction embedded mitigation measures outlined in Section 8.6 have not been quantitatively assessed given the early stage of the Proposed Development's design. It is expected that with the implementation of such mitigation measures, the magnitude of construction stage emissions will be reduced from the emissions presented in Table 8.5.

## Supporting Infrastructure

8.7.12 The Proposed Development includes supporting infrastructure, such as landscaping, drainage infrastructure, biodiversity provision, footway and cycleway and ancillary works. Infrastructure elements such as these do not have established benchmark figures as GHG emissions can vary significantly between individual developments. Published LCA data in general for infrastructure elements is lacking. At this outline design stage, specific-material quantities are also unavailable for the supporting infrastructure.

8.7.13 Therefore, as set out in paragraph 8.4.13, infrastructure elements of the Proposed Development will not be assessed quantitatively. It is anticipated that the majority of emissions from the Proposed Development are likely to result from the construction of the business park and proposed car park as construction of both these elements are typically considered to be carbon intensive. Future reserved matters applications will consider emissions from supporting infrastructure in more detail.

## Sensitivity of the Receptor

8.7.14 GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global atmospheric mass of the relevant GHGs and consequent warming potential, expressed in $CO_2$-equivalents, has therefore been treated as a single receptor of **high** sensitivity (given the severe consequence of global climate change and the cumulative contributions of all GHG emissions sources).

## Significance of Effect

8.7.15 Some construction-stage emissions may occur from associated construction materials supply chains outside the territorial scope of the UK's national carbon budget (or any local carbon budgets). Nevertheless, total construction-stage emissions have been contextualised within this budget in order to assess their significance.

8.7.16 As GHG impacts are global, regardless of where the release point is geographically located, for the purpose of EIA the GHG impacts of the Proposed Development are assessed against the significance criteria in UK guidance and goals for emission reduction.

8.7.17 Table 8.6 provides context against the relevant UK and Wales national carbon budgets for both the original 2019 GEA assumptions and current 2024 GEA assumptions. Construction activities are assumed to begin and complete in 2026, in the absence of further information at this stage, total construction stage emissions have been contextualised within the fourth UK carbon budget (2023-2027) and the Wales carbon budget 3 (2026-2030). It should be noted that the Wales carbon budget 3 (2026-2030) is yet to be formally published and has been calculated from the Climate Change (Carbon Budgets) (Wales) (Amendment) Regulations 2021 which states the Wales carbon budget 3 will be an average 58% reduction from the 1990 baseline.

8.7.18 The Tyndall Centre for Climate Change Research (2024) has recommended district-specific carbon budgets up to 2100 that, in its research, are considered to be compatible with a 1.5°C aligned trajectory for the UK. However, Tyndall Centre carbon budgets are for energy-related $CO_2$ emissions only and are therefore not directly relevant for construction-related emissions. It is not certain whether the construction materials will be sourced from within or outside the UK, therefore local level budgets would not be representative. As such, only the UK & Wales carbon budgets have been considered.

**Table 8.6: Proposed business park and car park construction stage emissions in the context of UK and Wales national Carbon Budgets.**

| | UK 4th Carbon Budget: 2023-2027 | Wales Carbon Budget 3: 2026-2030 |
|---|---|---|
| Carbon Budget ($tCO_2e$) | 1,950,000,000 | 120,000,000 |
| **Original 2019 GEA assumptions** | | |
| Total Construction Emissions ($tCO_2e$) | 158,837 | 158,837 |
| Total Construction Emissions as percentage of carbon budget | 0.01% | 0.13% |
| **Current 2024 GEA assumptions** | | |
| Total Construction Emissions ($tCO_2e$) | 128,158 | 128,158 |
| Total Construction Emissions as percentage of carbon budget | 0.01% | 0.11% |

8.7.19 Table 8.6 highlights that construction-stage emissions for both the original 2019 GEA assumptions and current 2024 GEA assumptions make a minor contribution to the UK and Wales national carbon budgets for the period 2023-2027 and 2026-2030 respectively. To determine significance, local and national policy goals should also be taken into account, as assessed below.

8.7.20 Construction embedded mitigation measures outlined in Section 8.6 focus on reductions to construction stage emissions through appropriate construction practices. While these measures have not been quantitatively assessed at this stage, it is considered that the measures constitute good construction practice aligned with a 1.5°C compatible trajectory towards net zero.

8.7.21 However, as described in Appendix 8.2: GHG Emissions Assessment, the majority of construction emissions are generated during the manufacturing of materials used for construction. At this stage of planning and without detailed design, no specific embedded mitigation to reduce GHG emissions associated with the manufacturing of construction materials has been specified for either the original 2019 GEA assumptions or current 2024 GEA assumptions. As such, it cannot be concluded that the overall GHG impacts at the construction stage of either scenario are in keeping with current and emerging local and national climate policy regarding the transition towards net zero.

8.7.22 Considering the embedded mitigation measures to reduce emissions associated with construction practices, potential magnitude of GHG emissions set out in Table 8.6, and absence of mitigation or emissions reduction measures associated with the manufacturing of materials used for construction,

based on the definitions in Table 8.4, the magnitude of impact on the **high** sensitivity receptor would result in **moderate adverse** construction stage effect for both the original 2019 GEA assumptions and current 2024 GEA assumptions, which is considered **significant** in EIA terms.

## 8.8 Assessment of Operational Effects

### Climate Change Risk Assessment

8.8.1 The risks from climate change that may impact the Proposed Development (applicable to both the original 2019 GEA assumptions, and current 2024 GEA assumptions) are likely to arise from flooding, consistently heightened temperatures, extreme summer heatwaves, and consistently reduced summer precipitation which are further detailed in Appendix 8.1.

8.8.2 The assessment of effects has considered the mitigation measures adopted (and detailed in section 8.6) as part of the Proposed Development in determining the combined risk score.

8.8.3 No risks to the Proposed Development due to climate change have been identified as significant. As such, the effect of climate change on the Proposed Development has been determined to be not significant for both the original 2019 GEA assumptions and current 2024 GEA assumptions.

### GHG Emissions Assessment

#### Magnitude of Impact

8.8.4 The Proposed Development would result in direct and indirect GHG emissions due to the use of electricity and gas within the buildings, road traffic movements generated by the Proposed Development and emissions associated with periodic maintenance, refurbishment and repair. It is anticipated that energy usage will be split between electricity and gas, with a majority of the energy from gas used for the gas boilers.

8.8.5 As explained in Appendix 8.2, emissions associated with maintenance, refurbishment and repair of the Proposed Development make up a minor and immaterial proportion of emissions across the whole life of a building. The design life and emissions associated with repair, maintenance and disposal of materials at the end of their life varies substantially. As this application is at the outline design stage, detailed information regarding material composition is not available. Emissions associated with such activities have therefore not been assessed further. All future reserved matters applications will include whole life carbon assessments when more detailed information is available, which would include repair, replacement and refurbishment emissions.

#### Energy Use

8.8.6 As no energy strategy is available at this stage, operational emissions are calculated using CIBSE Guide F benchmarks (CIBSE, 2012) which only covers regulated energy consumption.

8.8.7 Three benchmark categories were chosen as described in paragraph 8.4.33. The floor area for each use class is scaled by relevant benchmark intensities, giving an estimated annual energy demand (kWh/year) for both gas and electricity, which is then converted to GHG emissions using the latest available and relevant GHG conversion factors (DESNZ, 2024), providing estimated annual operational emissions for the proposed business park.

8.8.8 As detailed building specifications are also unavailable at this stage, the calculated operational GHG emissions using CIBSE Guide F benchmarks may not accurately represent the Proposed Development's operational energy consumption.

8.8.9 Furthermore, GHG emission factors for electricity and gas are updated annually to reflect ongoing grid decarbonisation in line with national policy for energy infrastructure. Therefore, it is likely that the factors will change over time. However, given the early design of the Proposed Development, a conservative approach has been taken.

8.8.10 It is assumed that construction would begin in 2026 with first year of operation from 2027. However, the delivery of the Proposed Development is anticipated to be phased, and therefore it is likely that this approach will overestimate operational GHG emissions.

8.8.11 For further detail regarding energy use emissions methodology, see the assumptions and limitations described in paragraph 8.4.32 and 8.4.33 and see Appendix 8.2.

8.8.12 Table 8.7 summarises total energy demand and GHG emissions for both the original 2019 GEA assumptions and current 2024 GEA assumptions of the proposed business park without any mitigation and considering only regulated energy use. Total emissions for energy use during operation is 6,498 $tCO_2e$ per year using the original 2019 GEA assumptions and 5,222 $tCO_2e$ per year using the current 2024 GEA assumptions. The current 2024 GEA assumptions sees a reduction in annual operational emissions by 1,276 $tCO_2e$ from the original 2019 GEA assumptions.

**Table 8.7: Proposed business park estimated energy demand and GHG emissions**

| Element | Gas demand (kWh/year) | Electricity demand (kWh/year) | Gas emissions ($tCO_2e$/year) | Electricity emissions ($tCO_2e$/year) | Total emissions ($tCO_2e$/year) |
|---|---|---|---|---|---|
| Business Park (original 2019 GEA assumptions) | 15,205,905 | 17,951,190 | 2,781 | 3,717 | **6,498** |
| Business Park (current 2024 GEA assumptions) | 12,524,677 | 14,157,699 | 2,291 | 2,932 | **5,222** |

## Transport

8.8.13 As the Proposed Development is assumed to predominantly be an office, industrial and warehouse use development, it is presumed that the majority of trips generated by the Proposed Development are likely to be light vehicles (cars) and heavy vehicles (Heavy Goods Vehicles (HGV)). It is assumed that all trips generated from the Proposed Development are additional to the baseline and have not been relocated from elsewhere. This is likely to lead to an overestimate of emissions, as many of these trips would likely have occurred in the absence of the Proposed Development. Nevertheless, to ensure a robust assessment, and to contextualise emissions within both national and local carbon budgets, a conservative approach has been taken.

8.8.14 To estimate emissions arising from vehicle trips generated by the Proposed Development, the ES Addendum Chapter 4: Transport Assessment provides an estimated number of trips generated as a result of the Proposed Development with consideration of a sustainable travel plan. The trips generated are based on a 12-hour period (07:00-19:00) and considers two-way trips. The trip generation numbers differ between the original 2019 GEA assumptions and current 2024 GEA assumptions due to changes in floor area and use class type of the Proposed Development.

8.8.15 The trip generated values were multiplied by average commuting mileage (for light vehicles) and average haulage mileage (for heavy vehicles), taken from National Travel Survey Statistics Data (Department for Transport, 2023) and from Road freight statistics (Department for Transport, 2011) respectively, then scaled by appropriate GHG emissions factors (DESNZ, 2024).

8.8.16 For further detail regarding transport emissions methodology, see Appendix 8.2.

8.8.17 Table 8.8 details total GHG emissions as a result of road traffic generated by the Proposed Development for light and heavy vehicles. Total emissions for transport during operation using the original 2019 GEA assumptions is 17,636 $tCO_2e$ per year and for the current 2024 GEA assumptions is 14,787 $tCO_2e$ per year. This is a decrease of 16% with the current 2024 scenario.

**Table 8.8: Estimated GHG emissions from transport generated by the Proposed Development.**

| Transport Mode | Total emissions ($tCO_2e$/year) | |
|---|---|---|
| | 2019 GEA assumptions | 2024 design GEA assumptions |
| Light vehicle | 6,088 | 4,311 |
| Heavy vehicle | 11,548 | 10,476 |
| **Total** | **17,636** | **14,787** |

8.8.18 Operational embedded mitigation measures for transport outlined in Section 8.6 have not been quantitatively assessed given the early stage of the Proposed Development's design. It is expected that with the implementation of such mitigation measures, the magnitude of operational stage emissions will be reduced from the transport emissions presented in Table 8.8. This is due to an increase in the use of sustainable travel modes such as buses, cycling and walking and a reduction in the use of light vehicles for commuting. In addition, the proportion of zero- and low-emission cars in the UK road fleet (such as EVs and hybrid cars) is expected to increase over time in line with national decarbonisation policy goals. For the purpose of this assessment however, present-day values have been used to be conservative.

### Summary

8.8.19 Table 8.9 summarises total operational emissions for year one of operation of the Proposed Development arising from energy use and transport for both the original 2019 GEA assumptions and the current 2024 GEA assumptions.

**Table 8.9: Summary of operational GHG emissions.**

| Emission Source | Total annual emissions ($tCO_2e$/year) | |
|---|---|---|
| | 2019 GEA assumptions | 2024 GEA assumptions |
| Energy use | 6,498 | 5,222 |
| Transport | 17,636 | 14,787 |
| **Total** | **24,134** | **20,010** |

## Sensitivity of the Receptor

8.8.20 GHG emissions have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The global atmospheric mass of the relevant GHGs and consequent warming potential, expressed in $CO_2$-equivalents, has therefore been treated as a single receptor of **high** sensitivity (given the severe consequence of global climate change and the cumulative contributions of all GHG emissions sources).

## Significance of Effect

8.8.21 It is assumed that the earliest year at which the Proposed Development will be operational is from 2027. Accordingly, the Proposed Development's operational stage emissions have been contextualised within the UK's fourth (2023-2027), fifth (2028-2032) and sixth (2033-2037) carbon budgets and the Wales carbon budget 3 (2026-2030). The Proposed Development GHG impacts given within Table 8.10 and Table 8.11 describes carbon budget expenditures that will occur as a result of emissions generated by the Proposed Development from both the original 2019 GEA assumptions and current 2024 GEA assumptions.

**Table 8.10: Operational GHG emissions Proposed Development in the context of the UK carbon budgets.**

| | UK 4th Carbon Budget: 2023-2027 | UK 5th Carbon Budget: 2028-2032 | UK 6th Carbon Budget: 2033-2037 | Total |
|---|---|---|---|---|
| UK Carbon Budgets ($tCO_2e$) | 1,950,000,000 | 1,725,000,000 | 965,000,000 | 4,640,000,000 |
| **Original 2019 GEA assumptions** | | | | |
| Total Operational Emissions ($tCO_2e$) | 24,134 | 120,670 | 120,670 | 265,473 |
| Operational emissions as percentage of carbon budget | 0.001% | 0.007% | 0.013% | 0.006% |
| **Current 2024 GEA assumptions** | | | | |
| Total Operational Emissions ($tCO_2e$) | 20,010 | 100,048 | 100,048 | 220,105 |
| Operational emissions as percentage of carbon budget | 0.001% | 0.006% | 0.010% | 0.005% |

**Table 8.11: Operational GHG emissions Proposed Development in the context of the Wales carbon budget.**

| | Wales Carbon Budget 3: 2026-2030 |
|---|---|
| Wales Carbon Budget ($tCO_2e$) | 120,000,000 |
| **Original 2019 GEA assumptions** | |
| Total Operational Emissions ($tCO_2e$) | 96,536 |
| Operational emissions as percentage of carbon budget | 0.08% |
| **Current 2024 GEA assumptions** | |
| Total Operational Emissions ($tCO_2e$) | 80,038 |
| Operational emissions as percentage of carbon budget | 0.07% |

8.8.22 The Tyndall Centre local carbon budgets are more stringent than the UK national budgets (as advised by the Climate Change Committee); the local carbon budget for Vale of Glamorgan would result in achieving zero or near zero carbon by 2041. The Tyndall Centre carbon budgets are for energy-related $CO_2$ emissions only. Table 8.12 describes the local Vale of Glamorgan-specific carbon budgets and how the Proposed Development's operational GHG impacts relates to it.

**Table 8.12: Operational GHG emissions for the Proposed Development in the context of the Vale of Glamorgan (VoG) carbon budget.**

| | VoG 4th Carbon Budget: 2023-2027 | VoG 5th Carbon Budget: 2028-2032 | VoG 6th Carbon Budget: 2033-2037 | Total |
|---|---|---|---|---|
| VoG Carbon Budgets ($tCO_2e$) | 1,800,000 | 900,000 | 400,000 | 3,100,000 |
| **Original 2019 GEA assumptions** | | | | |
| Total Operational Emissions ($tCO_2e$) | 24,134 | 120,670 | 120,670 | 265,473 |
| Operational emissions as percentage of carbon budget | 1.3% | 13.4% | 30.2% | 8.6% |
| **Current 2024 GEA assumptions** | | | | |
| Total Operational Emissions ($tCO_2e$) | 20,010 | 100,048 | 100,048 | 220,105 |
| Operational emissions as percentage of carbon budget | 1.1% | 11.1% | 25.0% | 7.1% |

8.8.23 The calculation of operational emissions does not incorporate future UK electricity grid decarbonisation as the penetration of renewable energy resources increases. The UK government target is to achieve a fully decarbonised power system by 2035 (BEIS, 2021). Further, as described in Appendix 8.2, transport emissions have been calculated using the current UK fleet mix and do not incorporate an increased proportion of zero emission vehicles on UK roads in the future. As such, it can be anticipated that emissions associated with operational energy demand from the Proposed Development (both the original 2019 GEA assumptions and current 2024 GEA assumptions) will see continuous decarbonisation during its operational lifetime.

8.8.24 Measures adopted as part of the Proposed Development to reduce emissions associated with energy use in buildings have not been specified at this design stage for either the original 2019 GEA assumptions or current 2024 GEA assumptions. Therefore, it cannot be concluded that the GHG impacts arising from energy use at the operational stage of either scenario are compatible with current and emerging local and national climate policy regarding the transition towards net zero.

8.8.25 Measures adopted as part of the Proposed Development to reduce emissions associated with transport are described in paragraph 8.6.9. These measures are supported by national and local policy, in particular the Net Zero Strategy and the Wales transport strategy. These policies show the changes in the UK car fleet required to achieve the UK's net zero commitments, in particular the increase in proportion of electric vehicles and need to promote active travel. Though the Proposed Development cannot directly influence transport emissions, as this lies beyond the Applicant's control, by promoting sustainable transport modes and suppression of vehicle parking through the application of a Car Parking Management Plan, the Proposed Development enables the changes necessary.

8.8.26 Considering the potential magnitude of GHG emissions set out in Table 8.10, Table 8.11 and Table 8.12 and absence of mitigation or reduction of emissions associated with energy use, based on the definitions in Table 8.4, the magnitude of impact on the **high** sensitivity receptor would result in **moderate adverse** operational stage effect for both the original 2019 GEA assumptions and current 2024 GEA assumptions, which is considered **significant** in EIA terms.

## 8.9 Further Mitigation

### Climate Change Risk Assessment

8.9.1 As there are no significant effects regarding the CCRA, no further mitigation measures are proposed.

### GHG Emissions Assessment

#### Construction

8.9.2 Further mitigation measures to minimise GHG emissions generated during construction will be investigated at the Reserved Matters application. Measures that are practical and viable would be implemented in detailed design. Such measures include:

- the use of alternative low carbon fuels and sustainable construction practices to minimise construction site emissions. Examples of which may include but not limited to:
  - use of Modern Methods of Construction (MMC) minimise GHG emissions generated;
  - avoid diverting earthworks off site where possible;
  - use of biofuels in site vehicles which have low emission factors than conventional diesel;
  - use of hydrogen or electric site vehicles and equipment;
  - use local suppliers and labour where possible; and
  - appropriate waste strategy to minimise construction waste and waste transport emissions through the application of the waste hierarchy.
- the use of alternative low carbon materials and opportunities to reduce materials with constructing the building structure and supporting infrastructure. Examples of which may include but not limited to:
  - lean design to minimise material use;
  - use materials with low embodied carbon intensities, such as asphalt, steel and concrete with recycled material content;
- use of materials with potential to store sequestered carbon, such as sustainably sourced timber;
  - consider the whole life carbon implications of material substitutes. Materials with an initial high embodied carbon content may be an optimal solution when considering the implications of durability, adaptability and operational energy use; and
  - incorporate future ease of disassembly or adaptability into building design. Doing so can minimise future end-of-life carbon implications and facilitate circular economy principles.

#### Operation

8.9.3 Further mitigation measures to minimise GHG emissions generated during operation will be investigated at the Reserved Matters application. Measures that are practical and viable, or mandatory as part of building regulations and policy, would be confirmed within an energy strategy at detailed design. Such measures include:

- operational design in line with the anticipated specifications of the Future Buildings Standard (FBS). The FBS is designed to deliver zero-carbon ready non-domestic buildings. This is achieved through an uplift of minimum energy efficiency and heating requirements for new non-domestic buildings through changes to Part 6, Part L (Conservation of fuel and Power) and Part F (ventilation) of the Building Regulations (Department for Levelling Up, Housing &

Communities (DLUHC), 2024). The FBS is expected to be introduced in England in 2025 and likely be introduced in Wales at a later date. Given construction of the Proposed Development begins in 2026, the FBS may apply to the new development. The FBS for non-domestic buildings focuses on:

  - high fabric standards to minimise heat loss;
  - all space heating and hot water demand met through low-carbon sources (such as heat pumps);
  - greater lighting efficacy; and
  - 'zero-carbon' ready buildings, meaning no further work will be needed for developments to have zero carbon emissions once the electricity grid has been fully decarbonised.

- follow the energy hierarchy in operational design to be in line with building regulations and the FBS (if applicable). This would include:
  - be lean (reduce building energy consumption). Measures include taking a 'fabric first' approach to ensure appropriate U-values (rate of heat loss through building elements), thermal mass within the building fabric, air permeability and sufficient natural daylight incorporated into the design;
  - be clean (supply the energy required in an efficient manner); and
  - be green (supply remaining energy from low carbon and renewable energy sources such as Power Purchase Agreements (PPAs) with energy suppliers).

## 8.10 Residual Effect

### Climate Change Risk Assessment

8.10.1 There are no significant effects regarding the CCRA due to the mitigation measures in place, therefore there are **no residual effects**.

### GHG Emissions Assessment

#### Construction

8.10.2 The GHG emissions associated with construction activities is considered to be of a significant moderate adverse effect. To mitigate this effect, measures to be investigated and then implemented into the detailed design at the Reserved Matters application are proposed in section 8.9. In particular, measures to reduce both construction site emissions and embodied carbon of materials used are proposed.

8.10.3 With the implementation of the suggested further mitigation measures, the impact magnitude is considered to be reduced, and the residual effect is likely to be **minor adverse**, which is considered **not significant** in EIA terms.

#### Operation

8.10.4 The GHG emissions associated with operational activities is considered to be of a significant moderate adverse effect. To mitigate this effect, measures to be investigated and then implemented into detailed design at the Reserved Matters application are proposed in section 8.9. In particular, measures to design the Proposed Development to be in line with the FBS and to follow the energy hierarchy are proposed. Doing so will result in a net-zero or net zero ready operational development that is aligned with UK and Wales net zero targets.

8.10.5 With the implementation of the suggested mitigation measures, the impact magnitude is considered to be reduced, and the residual effect is likely to be **minor adverse**, which is considered **not significant** in EIA terms.

## 8.11 Risk of Accidents or Disasters

8.11.1 It not considered likely that there will be any GHG-related construction-stage accidents and/or disasters, nor that there will be any construction-stage accidents and/or disasters that would cause significant GHG emissions.

## 8.12 Assessment of Cumulative Effects

8.12.1 All developments that emit GHGs have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a cumulative impact on climate change. Consequently, cumulative effects due to other specific local development projects are not individually predicted but are considered when considering the impact of the Proposed Development by defining the atmospheric mass of GHGs as a high sensitivity receptor.

## 8.13 Summary

8.13.1 This chapter assesses the impacts of climate change on the Proposed Development and the impact of GHG emissions caused directly or indirectly by the Proposed Development which contribute to climate change. As the Proposed Development is in outline design stage, detailed material quantities information is not available and only limited mitigation measures have been adopted at this stage.

### Climate Change Risk Assessment

8.13.2 The Met Office UKCP18 probabilistic dataset for the 2070-2099 time period compares to the 1981-2010 baseline suggests that the Proposed Development will experience increased temperatures and increased seasonality in precipitation patterns. Precipitation is projected to decrease during spring and increase during the autumn, while average temperatures are projected to increase throughout the year with the highest increases projected in July.

8.13.3 The most notable risk from climate change to the Proposed Development arises from increased ambient temperatures causing overheating of building users and the increased need for cooling, however this risk will be reduced by the inclusion of green infrastructure across the Site and designing the buildings with sufficient ventilation. Flood risk has also been reduced due to mitigation measures outlined in the Sustainable Drainage Assessment.

8.13.4 With consideration of the mitigation measures identified, the potential risk posed to the Proposed Development would be reduced to an acceptable and non-significant level in EIA terms. Therefore, no further mitigation is required.

### GHG Emissions Assessment

8.13.5 GHG emissions, as a result of construction activities, which includes the construction of the proposed business park and car park, have been calculated to total 158,837 $tCO_2e$ for the original 2019 GEA assumptions, and 128,158 $tCO_2e$ for the current 2024 GEA assumptions. As the Proposed Development is in outline only, no detailed material embodied carbon reduction measures can be quantified and therefore a high-level benchmark approach has been used instead. This results in a significant moderate adverse effect for both the original 2019 GEA assumptions, and current 2024 GEA assumptions.

8.13.6 As part of the Reserved Matters application, more detailed material quantities information will be available for accurate embodied carbon calculations and additional construction mitigation measures will be investigated and then implemented into the detailed design. Measures to be

investigated include the use of alternative low carbon fuels and sustainable construction practices to minimise construction site emissions and the use of alternative low carbon materials and opportunities to reduce materials when constructing the building structure and supporting infrastructure. The residual effect of construction GHG emissions associated with the Proposed Development, following the adoption of further mitigation measures is considered to result in a minor adverse effect, which is not significant in EIA terms.

8.13.7 GHG emissions as a result of operational activities, including energy use and transport emissions, have been calculated to total 24,134 $tCO_2e$ in year one of operations for the original 2019 GEA assumptions, and 20,010 $tCO_2e$ in year one of operations for the current 2024 GEA assumptions. As the Proposed Development is in outline design stage only, an energy strategy is unavailable and only limited mitigation measures have been adopted. This would result in a significant moderate adverse effect for both the original 2019 GEA assumptions and current 2024 GEA assumptions.

8.13.8 As part of the Reserved Matters application, further operational mitigation measures will be investigated and then implemented into the detailed design. Measures to be investigated include designing the development to be in line with the upcoming FBS and follow the energy hierarchy to be in line with building regulations and the FBS (if applicable). Adopting these operational design measures will ensure that the Proposed Development is net zero ready and compatible with UK and Wales net zero commitments. This is then considered to result in minor adverse effect, which is not significant in EIA terms.

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