Government Property Agency

AtkinsRéalis



MANCHESTER DIGITAL CAMPUS

Environmental Statement
Volume 2 - Chapter 10: Effects on Climate

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Executive Summary

Considering the effects on climate for a development is crucial in reducing associated Greenhouse Gas (GHG) emissions, ensuring climate resilience, promoting sustainable design, and complying with regulatory requirements. This approach helps create environmentally responsible developments that align with global efforts to combat climate change.

The assessment of the Proposed Development's climate effects focuses on quantifying the magnitude of emissions from individual sources and in total, comparing these to an assessed baseline. All emissions have been reported as their carbon dioxide equivalent (CO_2e) value, with one direct impact, global warming, and one direct receptor, the atmosphere considered.

The approach taken aligns with the guidance set out in the Institute of Environmental Management and Assessment (IEMA) GHG Guidance 2022 and Publicly Available Specification (PAS) 2080:2023 and breaks down the Proposed Development emissions into life cycle stages, and which of these are within the scope of the assessment.

A quantification of construction and operational phase emissions have been separately calculated using the OneClick Life Cycle Analysis tool. The tool is an online whole-life quantification tool and provides space to input material, transportation and construction activity information to calculate an itemised and overall emissions total.

Part of the rationale for the Proposed Development is to create sustainable and efficient offices, allowing the civil service to relocate from current buildings with poor sustainability and carbon credentials. The project includes several low-carbon design options to minimize GHG emissions:

- **Superstructure Façade**: Four different cladding types were assessed to identify the option with the lowest construction emissions.
- **Substructure Design**: Four alternative designs for non-core retaining walls were evaluated to minimize the use of high-emission materials.
- **Hard Landscaping**: Two different paving options were considered to reduce emissions associated with the construction of outdoor spaces.
- **Energy Efficiency**: The project targets a maximum operational energy consumption of 55 kWh/m²/year, aligned with the NABERS UK 5* rating.
- **Water Efficiency**: Operational water consumption is limited to 4 m³/year per full-time equivalent staff, following Department for Environment Food and Rural Affairs (DEFRA) best practice guidelines.

Further recommendations include exploring additional ways to reduce emissions during both construction and operation and implementing a Carbon Management Plan to monitor and manage emissions. The project also follows the PAS 2080:2023 carbon reduction hierarchy: Avoid, Switch, and Improve. This involves reducing the need for high-emission materials and processes, using low-carbon alternatives, and enhancing efficiency in construction and operation.

The Proposed Development would have the effect of releasing an estimated additional 67,249 tCO_2e into the atmosphere over its construction phase and an estimated additional 57,586 tCO_2e over its operation phase. These do not contribute more than 0.0019% and 0.0005% respectively to any of the UK Government Carbon Budgets and therefore overall do not constitute a significant effect.

Overall, the Proposed Development demonstrates a strong commitment to climate responsibility by integrating low-carbon design options and adhering to relevant guidelines. The thorough assessment and mitigation strategies ensure that the development's GHG emissions remain non-significant, contributing insignificantly to the UK Government Carbon Budgets.

10. Effects on Climate

10.1. Introduction

10.1.1. This chapter of the Environmental Statement (ES) assesses the likely effects of the Proposed Development with respect to climate. It outlines the assessment methodology, describes the existing baseline conditions, identifies potential impacts and provides an assessment of effects. The chapter also details the mitigation measures necessary to prevent, reduce, or offset any significant adverse effects, and discusses the likely residual effects after these measures have been implemented.

10.1.2. This chapter reports on two different types of cumulative effects: intra-project cumulative effects, which are the combined effects of individual topic impacts on a particular sensitive receptor; and inter-project cumulative effects, which consider the way in which the Proposed Development may give rise to impacts in combination with other developments the study area, termed Reasonably Foreseeable Future Projects (RFFPs). The outlined cumulative effects are then used to inform the overall assessment of cross-topic cumulative effects, which is reported in ES (Volume 2) Chapter 22: Cumulative Effects.

10.1.3. The Proposed Development has the potential to affect the Earth's climate by increasing the emissions of Greenhouse Gases (GHGs) into the atmosphere, which will occur during the construction, operational and decommissioning phases of its life. The Earth absorbs energy from the sun and re-emits it as thermal infrared radiation. GHGs in the atmosphere absorb this radiation, preventing it from escaping into space. The higher the concentration of GHGs, the more heat energy is retained, the higher global temperatures become. Due to human activities, the concentration of GHGs in the atmosphere has increased dramatically, leading to climate change. This leads to a myriad of indirect impacts as the climate responds to the increased atmospheric temperature.

10.1.4. The UK Government has made commitments to tackle the root cause of climate change by reducing GHG emissions, as well as to increase the resilience of development and infrastructure to the changing climate. The Climate Change Act 2008 (amended in 2019) sets a target to reduce net GHG emissions by at least 100% from 1990 levels by the year 2050.

10.1.5. The effective assessment and management of impacts on climate can enable the Proposed Development to reduce its impact by minimising GHG emissions as far as possible.

10.2. Competent expert evidence

10.2.1. This effects on climate assessment has been undertaken by:

- A Chartered Environmentalist who holds full professional membership with the Institution of Environmental Management and Assessment. They have over 6 years of knowledge and experience in effects on climate assessment and have used their knowledge and professional judgement to undertake this assessment.

10.3. Relevant legislation, policy and guidance

10.3.1. Table 10-1 below summaries the legislation and policy applicable to effects on climate.

Table 10-1 - Legislation and policy for effects on climate

Legislation / regulation	Summary of requirements
International	
Paris Agreement (2015)	Strengthened negotiations at Conference of the Parties (COP) 21 led to the 2015 Paris Agreement, the aim of which is to maintain the increase in global average temperature at 'well below' 2°C and 'pursue efforts' to limit the temperature increase even further to 1.5°C. In 2018, the International Panel on Climate Change (IPCC) published a special report in response to the Paris Agreement, to present the impacts of the targeted 1.5°C temperature rise. The report highlighted that to achieve this, global emissions must decrease by 45% by 2030 (against a 1990 baseline), and that net zero global emissions (where emissions and removals from the atmosphere are balanced) must be achieved by 2050. This is noted to require rapid and far-reaching transitions of every sector on an unprecedented scale.
National	
Climate Change Act (2008, amended 2019)	To support international efforts, the UK Climate Change Act (2008) set a legal reduction target of 80% against 1990 levels by 2050. It also introduced a series of carbon 'budgets' for five-year periods, to act as stepping-stones to the overall reduction. There are budgets currently set up to 2037. In response to the ambitions of the Paris Agreement, in 2019 the Climate Change Act was amended to set the overall reduction target by 2050 to at least 100% in net emissions against 1990 levels.
Construction 2025, HM Government (2013)	Construction 2025 sets out how efficiency improvements will be created in construction covering sustainability and carbon and including a target to reduce emissions by 50%. The emissions reduction target of 50% is not project specific, and the efficiency improvements are broad. In terms of the Proposed Development and emissions reduction, the reduction target should be taken into account when developing project specific mitigation measures, where relevant.
National Planning Policy Framework (2023)	Paragraph 157 outlines that the planning system should support the transition to a low carbon future in a changing climate. The system should encourage the reuse of existing materials, support low carbon infrastructure and shape places in ways that contribute to radical reductions in greenhouse gas emissions. Paragraph 159 outlines that new development should be planned to help reduce greenhouse gas emissions and that local requirements on the sustainability of buildings should reflect the Government's policy for national technical standards.
Net Zero Strategy: Build Back Better, HM Government (2021)	Sets out the UK Government's strategy for continuing the path to Net Zero by setting out clear policies and proposals for keeping the UK on track for the coming carbon budgets, the National Determined Contributions and the government's vision for a decarbonised economy in 2050.

Legislation / regulation	Summary of requirements
Powering up Britain: Net Zero Growth (2023)	This plan builds on the foundations of the Net Zero Strategy and bolsters the UK's commitments to deliver Net Zero by: ▪ Achieving net zero in the most pro-growth, pro-business way ▪ Responding to the Climate Change Committee's 2022 Progress report to Parliament ▪ Provide a Carbon Budget Delivery Update that sets out a package of proposals and policies that will enable us to meet carbon budgets
Regional & Local	
Manchester City Council Climate Change Framework 2020–2025[1] and updated in 2022[2]	This provides a high-level strategy for the city to tackle its GHG emissions. It includes the key target to meet its carbon budget targets, which are based on recommendations by Tyndall Centre for Climate Change Research[3]. An update in 2022, noted that the city is not meeting its target of 13% reduction in emissions per year and is not on target to stay within its carbon budget for 2018-2100[4].
Manchester's Core Strategy 2012 – 2027[5]	Policy EN4 sets out how the council seek to reduce CO2 emissions by enabling low and zero carbon development. It sets out the design approaches that developments should follow in order to mitigate their emissions, particularly through the use of energy efficient technologies and low carbon energy generation.
5 Year Environment Management Plan for Greater Manchester (2019–2024)[6]	This plan sets out how Manchester will work towards its wider environment and climate targets over the 5-year period. Measures include increasing local renewable electricity generation by 45MW, decarbonising heating of buildings.
Greater Manchester Combined Authority Places for Everyone Joint Development Plan[7]	This sets out a long-term plan for jobs, new homes and sustainable growth. It plays a critical role in the Council's commitment to be carbon neutral by 2038, setting out a pathway for new development to be carbon neutral by 2028 through Objective 7. Relevant policies include: Policy JP-S1: Sustainable Development - setting out the Greater Manchester Vision for addressing Climate Change and meeting their carbon commitments. Policy JP-S3: Carbon and Energy - setting out methods for de-carbonising development. Policy JP-S3: Heat and Energy Networks - requiring the delivery of renewable and low carbon energy schemes. Policy JP-S4: Flood Risk and the Water Environment - setting out water related measures to adapt and reduce the impacts of climate change.

[1] Manchester Climate Change Framework 2020-25 — MCCA
[2] 2022 Update to the Framework — MCCA
[3] Objectives and Targets Review 2020 — MCCA (manchesterclimate.com)
[4] 2022 Update to the Framework — MCCA (manchesterclimate.com)
[5] Core Strategy 2012-2027 | Core Strategy 2012-2027 | Manchester City Council
[6] https://www.greatermanchester-ca.gov.uk/media/1986/5-year-plan-branded_3.pdf
[7] Places for Everyone | Places for Everyone | Manchester City Council

Legislation / regulation	Summary of requirements
	Policy JP-S6: Resource Efficiency - setting out measures to achieve a circular and zero-waste economy.

10.3.2. Table 10-2 below summaries the Technical Standards and Guidance applicable to effects on climate.

Table 10-2 - Technical standard and guidance for effects on climate

Technical standards / guidance	Summary of requirements
Institute of Environmental Management and Assessment (IEMA) 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (GHG Guidance) (2022)	Guidance to assist with addressing GHG emissions assessment, mitigation and reporting in statutory and non-statutory Environmental Impact Assessments. Considered best practice for the completion of climate emissions assessments as part of EIAs.
Publicly Available Specification 2080:2023 Carbon Management in buildings and infrastructure	Acts as a global standard for managing whole life carbon emissions within the built environment. The framework looks at the whole value chain, aiming to reduce carbon through more intelligent design, construction and use. The principles of PAS 2080:2023 are used to inform the assessment of projects on climate and supplement the guidance provided in IEMA GHG Guidance.
Royal Institution of Chartered Surveyors (RICS) Whole life carbon assessment for the built environment (2023)	RICS guidance provides details on adopting a whole life approach to quantifying carbon emissions (embodied and operational) across all project types, and provides a clear, consistent and accurate methodology for their measurement and reporting. It emphasises the importance of considering and managing carbon emissions from construction materials, design, construction processes, operational use, and eventual decommissioning or demolition to support sustainability goals.

10.3.3. The UK Government Carbon Budgets are presented in Table 10-3.

Table 10-3 - UK Government Carbon Budgets

UK Carbon budget period	UK Carbon budget (tCO_2e)
1st carbon budget (2008 to 2012)	3,018 $MtCO_2e$
2nd carbon budget (2013 to 2017)	2,782 $MtCO_2e$
3rd carbon budget (2018 to 2022)	2,544 $MtCO_2e$
4th carbon budget (2023 to 2027)	1,950 $MtCO_2e$
5th carbon budget (2028 to 2032)	1,725 $MtCO_2e$
6th carbon budget (2033 to 2037)	965 $MtCO_2e$

10.4. Assessment methodology

10.4.1. The approach taken aligns with the guidance set out in the IEMA GHG Guidance and PAS 2080:2023 outlined in Table 10-2.

10.4.2. It is key to note that whilst effects on climate is a wide-ranging topic in terms of potential sources, it is simple in terms of its receptors and impacts because:

- There is only one receptor, the atmosphere.
- There is only one direct impact, global warming.
- All units of CO_2e can be considered to have the same impact no matter where they are emitted.

10.4.3. Therefore, assessment of the effects of the Proposed Development on climate is limited to quantification of the magnitude of emissions, from individual sources and in total, and comparison of these to the baseline. Different GHGs have different global warming potentials, and to account for this they will be reported throughout this assessment as their carbon dioxide equivalent (CO_2e) value.

Study area

10.4.4. The study area includes all carbon emitting activities within the Proposed Development as well as relevant carbon emitting activities beyond the Site boundary that contribute to the total carbon footprint during construction and operation phases. The study area is not limited to the geographic extent of the Site itself, as many emissions will result from off-site activities (e.g. material extraction and production).

10.4.5. The activities for which emissions have been quantified in the assessment include the direct and supply chain activities for the Proposed Development's lifecycle for both the construction and operation stages of the Proposed Development. The specific elements of the Proposed Development included in the assessment are listed in Table 10-4.

10.4.6. An assessment of the effects on climate of the Proposed Development without mitigation has not been carried out. As stated in Section 5.3 of the IEMA GHG Guidance 'any mitigation measures that are committed to need to be included within the assessment'. The Proposed Development has a number of embedded mitigation measures that are detailed in Section 10.8 and these have been included within the assessment.

Methodology

10.4.7. The life cycle stages and GHG emissions sources included within the assessment are presented in Table 10-4.

Table 10-4 – Sources and lifecycle stages for Proposed Development GHG emissions

Phase	Sub stages of life cycle (using PAS 2080:2023 categories)	Potential sources of GHG emissions (not exhaustive)	EIA Scope
Site Preparation and Construction	A1 – 3 Embodied carbon from material supply	Embodied GHG emissions associated with the required raw materials, transportation from source and their manufacture	Yes

Phase	Sub stages of life cycle (using PAS 2080:2023 categories)	Potential sources of GHG emissions (not exhaustive)	EIA Scope
	A4 Transportation of materials to worksite	Emissions from the transportation of workers and materials to Site	Yes – Transportation of materials No – Employee travel to the Site is unknown at the current stage of design, and would be expected to be only a small proportion of the total emissions during the construction phase
	A5 Construction processes	Activities for organisations conducting construction work.	Yes
	Land Use Change	GHG emissions mobilised from vegetation or soil loss during construction	No – Existing site is an expanse of concrete with minimal tree and vegetation cover. GHG emissions from soil excavations are anticipated to be minimal as excavations are taking place on made ground. Therefore, emissions from vegetation or soil loss during construction will be negligible.
Operational Phase	B1 Use	Emissions from the use of materials, production of waste during the Proposed Development's operation, workers travel to the Proposed Development.	No - quantities of materials and waste generated from operation are not yet known and are likely to constitute < 5% of total emissions.
	B2 – B5 Maintenance and repair	Embodied GHG emissions associated with the required replacement materials, transportation from source and their manufacture	Yes
	B6 Operational Energy Use	Energy consumption during the Proposed Development's operation	Yes

Phase	Sub stages of life cycle (using PAS 2080:2023 categories)	Potential sources of GHG emissions (not exhaustive)	EIA Scope
	B7 Operational Water Use	Water consumption during the Proposed Development's operation	Yes
	Land use Change	Ongoing land use GHG emissions/sequestration each year	No – there is anticipated to be minimal land-use change at the Site. Habitat creation will occur through Biodiversity Net Gain requirements but details on GHG emissions are currently unknown.
Decommissioning / End-of-life Phase	C1-4	Deconstruction activities, transport and processing of waste, disposal of waste materials	No – activities not known at this stage given that there is no anticipated end-of-life date for the Proposed Development

Construction

10.4.8. A quantification of construction phase emissions has been calculated using the OneClick life-cycle assessment (LCA) tool. The tool is an online whole-life quantification tool and provides space to input material, transportation and construction activity information under the following categories:

- Earthworks and mass hauling
- Foundations and geotechnical structures
- Technical structures, construction works and systems
- Surface and pavement layers
- Materials used on the construction site
- Waste generated on-site

10.4.9. The tool uses a range of pre-programmed materials data (e.g. mass) and carbon factors to calculate an itemised and overall emissions total. Materials emissions factors are sourced from a wide array of sources, including Environmental Product Declarations and the Inventory of Carbon and Energy (ICE) database v2 and v3. These factors are in tCO_2e/t. Where an input unit is not required as a mass, such as numbers or metres of a product, a conversion factor is applied. This is based upon the mass of a product calculated using suppliers' specifications and technical drawings. The design and construction information for the assessment was obtained from the design team and based on the Stage 2 design for the Proposed Development.

Transportation of materials (A4)

10.4.10. Information relating to where materials will be sourced is not yet available, as this will be determined at a later date by the appointed Principal Contractor. Therefore, the RICS guidance Table 17 has been used

to predict the distances and method of transport that materials will be transported to the Site during construction.

Construction activities and processes (A5)

10.4.11. At this stage of design, there is limited information available relating to the construction processes and activities required to construct the Proposed Development. Therefore, the GHG emissions from construction activities has been estimated using the RICS guidance. Section 5.1.4 of this guidance states that baseline building-specific impacts related to construction activities in the UK are anticipated to be 40 $kgCO_2e/m^2$ of the Gross Internal Area. The combined Gross Internal Area for the Proposed Development is 84,000 m^2.

Operation

10.4.12. Operational emissions have been calculated separately from the OneClick LCA tool.

10.4.13. There is no project specific data available for direct emissions associated with operating the Proposed Development, such as for lighting, maintenance and refurbishment during its operational life. However, the Proposed Development has specific targets relating to operational energy and water use that it must meet as a minimum to comply with its NABERS 5* target for energy and DEFRA best practice guidelines for water consumption. Therefore, it is assumed that the Proposed Development will, as a minimum, achieve these targets.

10.4.14. The targets are:

- Operational energy consumption will be a maximum of 55kWh/m^2/year of the Gross Internal Floor Area.
- Operational water consumption will be a maximum of 4m^3/year per each full-time equivalent staff.

Assessment of significance

10.4.15. The method of assessment of whether the calculated GHG emissions from the Proposed Development will have a significant effect on climate has been determined in accordance with IEMA's 2022 guidance. There is no legal limit for GHG emissions for any one development. The guidance notes that the level of significance should be related to how a project contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050, as stated in section 6.2 of the guidance: *"The crux of significance…is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050 (or other date as defined in targets for devolved administrations)."*

10.4.16. The IEMA 2022 guidance document notes that practitioners need to consider whether project GHG emissions are aligned to achieving net zero by 2050, using the science based 1.5°C trajectory. Where this is not the case, then the effects are judged to be moderate adverse or major adverse, and thus can be classed as a significant effect. Projects that are compatible with the trajectory can have their effects classed as minor adverse, or where the project achieves GHG emission mitigation that goes beyond the trajectory, negligible. In both cases, the effects are not considered to be significant. Projects that result in GHG emissions being avoided or removed from the atmosphere can be considered to have a significant beneficial effect. The IEMA 2022 guidance notes that the UK 2050 target for net zero and interim carbon budgets are considered by the UK Climate Change Committee to be compatible with the required trajectory.

10.4.17. The percentage contribution of the Proposed Development to the national carbon budgets has been determined in accordance with the IEMA 2022 guidance on significance. Although the IEMA guidance

suggests that, for context, it would be good practice to consider a project's GHG emissions in relation to sector-based targets, there are currently no sector budgets for commercial and residential development or any other sector provided by the UK Climate Change Committee, the body responsible for developing the UK and devolved administrations' carbon budgets.

Assumptions and limitations

10.4.18. The following assumptions have been made as a result of the assessment:

- Construction processes will produce 40 $kgCO_2e/m^2$ of Gross Internal Area.
- Gross Internal Area will total 84,000 m^2 for the Proposed Development.
- There will be 4,373 full time equivalent staff on any one day during operation
- Operational energy consumption will be a maximum of $55kWh/m^2$/year of the Gross Internal Floor Area.
- Operational water consumption will be a maximum of $4m^3$/year per each full-time equivalent staff.
- The Proposed Development will begin construction in 2025 and take circa 48 months.
- The Proposed Development will begin operation in 2030 and operate for at least 60 years.
- Both operational energy and water usage remain consistent throughout the lifespan of the Proposed Development.
- The carbon factors for operational energy and water consumption remain consistent throughout the lifespan of the Proposed Development.
    - Note: This assumption is considered conservative as operational energy is expected to decarbonise in line with Net Zero targets.

Consultation

10.4.19. No specific consultation has been undertaken as part of this assessment.

10.5. Baseline conditions

National emissions

10.5.1. The UK's provisional GHG emissions in 2023 were 384.2 million tonnes (Mt) carbon dioxide equivalent (CO2e), 5.4% lower than in 2022[8]. The buildings and product use sector was the second largest emitting sector in 2023, contributing 20% of all emissions, after domestic transport with 29% of the total. The total UK emissions for 2022 were 406.2 MtCO2e, 3.5% less than 2021, with buildings and product uses contributing 20% of emissions[9].

Regional emissions

10.5.2. The total GHG emissions for Manchester for 2021 (the last reported year) were 2,095.6 ktCO2e[10]. This represents a 48% decrease since 2005, when emissions for Manchester were estimated to be 3,993.6

[8] https://assets.publishing.service.gov.uk/media/660445fce8c442001a2203d0/uk-greenhouse-gas-emissions-provisional-figures-statistical-summary-2023.pdf
[9] https://assets.publishing.service.gov.uk/media/65c0cf2e70428200137521cd/2022-final-emissions-statistics-one-page-summary.pdf
[10] UK local authority and regional greenhouse gas emissions statistics - GOV.UK

ktCO2e. The public sector contributed 7% of emissions in 2021, the third largest emitting sector after domestic and transportation sectors.

Site-specific emissions baseline

10.5.3. Currently, the Proposed Development comprises a vacant brownfield Site which comprises hardstanding following demolition of the retail park that formerly occupied the Site. As a result, the existing site has no associated GHG emissions. Therefore, it is assumed, as a worst-case scenario, that the site-specific emissions are 0 tCO_2e.

10.6. Potential impacts

10.6.1. The construction stage of the Proposed Development would have an adverse effect on climate contributing to climate change, as it would give rise to GHG emissions. These emissions would arise from the production of materials used in construction, their transportation to Site, and onsite through construction activities (e.g., emissions from diesel-fuelled construction plant).

10.6.2. The operational stage of the Proposed Development would also have an adverse effect on climate contributing to climate change, as it would give rise to GHG emissions. These emissions would arise from the use of operational energy and water use onsite.

10.7. Assessment of effects

10.7.1. This section presents the findings of the GHG emissions assessment for the construction and operation phases of the Proposed Development. This section considers whether any likely significant effects are predicted to occur.

Construction phase

Embedded mitigation

10.7.2. Mitigation to reduce the construction phase GHG emissions has been included in the RIBA Stage 2 design as part of the design principles. Therefore, not all design changes that have mitigated GHG emissions have been captured in this section. However, at the start of the RIBA Stage 2 design process optioneering of the following elements was undertaken to help inform design decisions during RIBA Stage 2 and reduce GHG emissions from construction:

- Superstructure Façade – 4 different cladding types were assessed for their construction emissions
- Substructure – 4 alternate designs to replace non-core retaining walls
- Hard landscaping – 2 different paving options considered

10.7.3. Where applicable and feasible, low-carbon design options have been included in the RIBA Stage 2 design to reduce GHG emissions during the construction stage.

Construction effects

10.7.4. A summary of construction phase GHG emissions for the Proposed Development is presented in

10.7.5. Table 10-5.

10.7.6. The construction phase of the Proposed Development will generate an estimated 67,249 tCO_2e. The largest category of emissions comes from the production of materials required for construction. As emissions from construction do not occur in the baseline scenario, it can be considered that the construction stage of the Proposed Development would have the effect of releasing an estimated additional 67,249 tCO_2e into the atmosphere.

Table 10-5 - Construction phase emissions

Project element	Emissions (tCO_2e)			
	Materials (A1-3)	Transportation (A4)	Construction processes (A5)	Total
North building	25,277	851	4,544	30,672
South building	20,502	628	2,801	23,932
Basement	8,674	818	3,154	12,646
Total	**54,453**	**2,297**	**10,499**	**67,249**

Note: Emissions are rounded to the nearest tonne

Operation phase

Embedded mitigation

10.7.7. There were two key operational targets that the Proposed Development had to adhere to as part of the RIBA Stage 2 design process. These targets aimed to reduce the operational energy and water consumption of the Proposed Development. The operational energy target is aligned to the NABERS UK 5* rating[11], whilst the water consumptions target is aligned to Construction Industry Research and Information Association W11 guidance[12]. These were:

- Operational energy consumption will not exceed 70kWh/m^2/year
- Operational water consumption will not exceed 4m^3/year per full time equivalent staff

10.7.8. Design principles aimed to achieve these targets as a minimum and embedded mitigation has been included in the RIBA stage 2 design as a result.

Operation effects

10.7.9. A summary of operation phase GHG emissions for the Proposed Development is presented in Table 10-6.

10.7.10. The operation phase of the Proposed Development will generate 57,586 tCO_2e over the 60-year appraisal period of the operational phase[13]. The largest category of emissions comes from the operational energy requirements of the Proposed Development. As site-specific baseline emissions for

[11] https://www.nabers.gov.au/about/nabers-international/nabers-uk
[12] https://www.ciria.org/CIRIA/Resources/Free_publications/KPI_water_offices.aspx
[13] Note: As the Proposed Development has no anticipated end date, a 60-year operational appraisal period has been used to show GHG emissions over the Proposed Development's operation phase.

the Site are 0 tCO_2e, it can be considered that the operation stage of the Proposed Development would have the effect of releasing an additional 57,586 tCO_2e into the atmosphere.

10.7.11. In the Opening Year, the Proposed Development will generate 957 tCO_2e. The largest category of emissions comes from operational energy.

Table 10-6 - Operation phase emissions

Category	Emissions (tCO_2e)				
	Opening Year (2030)	**Fourth Carbon budget (2022-27)**	**Fifth Carbon budget (2028-32)**	**Sixth Carbon budget (2033-37)**	**60-year operational phase**
Operational energy	934	0	2,870	4,783	57,401
Operational water	3	0	15	15	185
Total	**937**	**0**	**2,885**	**4,798**	**57,586**

Note: Emissions are rounded to the nearest tonne

Comparison to the UK Government Carbon Budgets

10.7.12. The Proposed Development is likely to contribute 124,835 tCO_2e to the UK Government Carbon Budgets across the period 2025-2037. Table 10-7 shows the proportion of the relevant carbon budgets that the Proposed Development would contribute over the 5-year budget periods.

10.7.13. The net contribution of the Proposed Development to the fourth UK Government carbon budget would be 33,625 tCO_2e (equivalent to 0.0017% of the budget). The net contribution of the Proposed Development to the fifth UK Government carbon budget would be 36,510 tCO_2e (equivalent to 0.0021% of the budget). The net contribution of the Proposed Development to the sixth UK Government carbon budget would be 4,798 tCO_2e (equivalent to 0.0005% of the budget).

Table 10-7 - Proposed Development emissions compared to the UK Government Carbon budgets

Proposed Development phase	Net GHG emissions (tCO_2e)	Relevant UK Government carbon budget		
		Fourth Carbon budget (2022-27)	**Fifth Carbon budget (2028-32)**	**Sixth Carbon budget (2033-37)**
Construction	67,249	33,625	33,625	
Operation	57,586		2,885	4,798
Total	**124,835**	**33,625**	**36,510**	**4,798**
% contribution to budget	**-**	**0.0017%**	**0.0021%**	**0.0005%**

10.8. Additional mitigation and enhancement measures

10.8.1. Embedded mitigation measures, which have been accounted for as part of the impact assessment, are summarised in Section 10.7. The impact assessment concludes that no potential significant effects remain for the effects on climate assessment, therefore no additional mitigation measures are required.

10.8.2. However, the Proposed Development should aim to reduce GHG emissions by as much as reasonably practical. Therefore, further design and mitigation should be carried out in line with the principles set out in PAS 2080:2023 'Carbon Management in Buildings and Infrastructure'. Emissions should be mitigated further by applying the PAS 2080:2023 carbon reduction hierarchy: Avoid, Switch and Improve. For operation, mitigation should also consider the energy hierarchy set out in Manchester City Council's Core strategy (Policy EN 4)[14]:

1. Minimise energy demand.
2. Maximise energy efficiency.
3. Use renewable energy.
4. Use low carbon energy.
5. Utilise other energy sources.

10.8.3. As the Proposed Development progresses, the opportunity to make significant carbon reductions reduces, and the cost and disruption associated with those changes increases, therefore the aim should be to mitigate GHG emissions as early in the design as possible. Mitigation should be implemented and monitored through the preparation of a Carbon Management Plan (CMP) and carbon reduction tracker. The Principal Contractor should be involved in this process as soon as possible and the CMP should be continually updated and considered from construction through to the end of operation.

Avoid

10.8.4. The opportunity for the greatest reduction in carbon emissions is typically found right at the beginning of a project, when the strategy for meeting objectives is decided. Materials and construction processes can be reduced to great effect by changing the approach to the problem and reducing the amount of hard engineering required.

- Maximise potential for re-using and / or refurbishing existing assets to reduce the extent of new construction required
- Explore alternative lower carbon options to deliver the project objectives (i.e. shorter route options with smaller construction footprints)
- Give particular consideration to how materials which are key emission sources can be reduced. Note that if reducing these materials would increase use of another, it will be important to assess whether the net effect is a carbon benefit
- Avoid materials which come in disposable packaging, particularly that which cannot be recycled. Work with supply chain to develop alternative packaging and delivery options.

Switch

10.8.5. During design, there is opportunity to use smart engineering solutions to reduce carbon. Key things to consider will be the use of innovative low-carbon materials, and how to set the Proposed Development up for efficient delivery by design interventions.

[14] https://www.manchester.gov.uk/downloads/download/5672/core_strategy

- Apply low carbon solutions (including technologies, materials and products) to minimise resource consumption during the construction, operation, user's use of the project, and at end-of-life
- Construct efficiently, using techniques (e.g. during construction and operation) that reduce resource consumption over the life cycle of the Proposed Development
- Specify the use of recycled materials rather than virgin alternatives, for example: recycled aggregate, or recycled plastic materials. Note that the benefits of using recycled materials should be weighed against potential carbon costs. For example, local virgin material may have a lower overall carbon impact than recycled material sourced from a great distance. Design for zero carbon operation. The Proposed Development should be passive (non-energy consuming) where possible, with renewable technologies to supply energy needs where not
- Design for low-carbon maintenance. Preferentially select long-life options which will require as little maintenance and infrequent replacement as possible
- Design with deconstruction in mind, taking a 'circular' approach where all elements could be disassembled and materials reused at end of life. Consider the Proposed Development as a 'material bank' which will be a source of materials rather than waste at the end of its life
- Work with the supply chain to understand the carbon impact of products / materials and challenge them to reduce this
- Recycle waste rather than sending to landfill
- Specify materials sourced as locally as possible, to reduce transport. During design, consider whether elements which cannot be sourced locally can be designed out or a different solution used
- Use more sustainable means of transporting materials to Site
- Use local workforce to reduce emissions from commuting and business travel. Make use of video conferencing and other digital technologies to reduce vehicle trips
- Mandate preparation of a construction workforce travel plan which maximises vehicle sharing and reduces trip numbers. Encourage the contractor to make use of smart scheduling software
- Use renewable energy onsite, for example solar lighting, and fuel cell electric welfare units
- Mandate use of electric and other low-carbon construction plant as standard on the Proposed Development. To make best effect of this measure, plant should be charged from renewable sources. Diesel should be used as a last resort when no renewable option is available
- Mandate use of electric vehicles (EVs) to transport workers and provide EV charging points at Site. As with construction plant, electricity should be generated from renewable sources.

Improve

10.8.6. After addressing the two steps above, the Proposed Development will identify, assess and integrate measures to further reduce carbon through offsetting or sequestration, on-site or off-site.

- Maximise vegetation cover to enhance carbon sequestration. Give careful thought to the species selected, as sequestration rates vary, and also to how vegetation will be managed on an ongoing basis. Vegetation which requires frequent intervention (grass cutting, hedge trimming) may generate more emissions than it sequesters.
- Use wood for permanent design elements. This can provide a long-term store for carbon in the built environment. Sustainable procured wood from local sources should be procured where possible.
- Once opportunity to reduce and sequester carbon emissions within the development boundary has been maximised, consideration may need to be given to financing third-party projects. In order of preference, these could be:
    - Collaborative approach: Work with the local Wildlife Trust, nature partnerships and other groups trying to achieve similar goals, to support local projects by incorporating them into the development.

- Green funds: Provide funding for local third-party landowners to plant and manage woodland and other beneficial land-uses for sequestration and implement renewable energy technologies.
- External offset: Purchased through external offset companies, these might include renewable energy projects, energy efficiency projects, landfill gas recovery, and community projects.

10.9. Residual effects

Construction

10.9.1. The Proposed Development will generate an estimated 67,249 tCO_2e over its construction phase, compared to the site-specific emissions baseline.

10.9.2. The GHG emissions from the construction of the Proposed Development do not contribute more than 0.0019% to any of the UK Government Carbon Budgets. Therefore, it is considered that the construction phase of the Proposed Development will at no point impact the UK Government's ability to meet its Carbon Budgets and subsequently its Net Zero legal requirement. The UK Government Carbon Budgets align with the GHG emissions reduction trajectory required to limit warning to 1.5C, in line with the IEMA GHG Guidance for determining significance (as noted in Section 10.4).

10.9.3. Therefore, the construction phase of the Proposed Development is considered to have a minor, non-significant effect on the climate.

Operation

10.9.4. The Proposed Development will generate an estimated 57,586 tCO_2e over its operation phase, compared to the site-specific emissions baseline. As noted in Section 10.7, this number is considered worst-case as electricity emissions are likely to decarbonise over the following years in line with Net Zero targets.

10.9.5. The GHG emissions from the operation of the Proposed Development do not contribute more than 0.0005% to any of the UK Government Carbon Budgets. Therefore, it is considered that the operation phase of the Proposed Development will at no point impact the UK Government's ability to meet its Carbon Budgets and subsequently its Net Zero legal requirement. The UK Government Carbon Budgets align with the GHG emissions reduction trajectory required to limit warning to 1.5C, in line with the IEMA GHG Guidance for determining significance (as noted in Section 10.4).

10.9.6. Therefore, the operation phase of the Proposed Development is considered to have a minor, non-significant effect on the climate.

10.10. Cumulative effects

10.10.1. The atmospheric concentration of GHGs and resulting effect on climate change is affected by all global sources and is not affected by localised differences in GHG emissions. All global cumulative GHG sources are relevant to the effects on climate change and therefore, there is no basis for selecting any particular project or area that has GHG emissions for assessment over any other.

10.10.2. On this basis, there are no specific additional cumulative effects from the assessment of the impacts of the Proposed Development.

10.11. Summary and conclusions

10.11.1. The GHG emissions of site-specific baseline for the Proposed Development are assumed to be 0 tCO_2e, as a worst-case scenario.

10.11.2. This assessment has been undertaken in line with PAS 2080:2023 and the IEMA GHG Guide. No specific consultation has been proposed.

10.11.3. The Proposed Development will generate an estimated 67,249 tCO_2e over its construction phase, compared to the site-specific emissions baseline. The GHG emissions from the construction of the Proposed Development do not contribute more than 0.0019% to any of the UK Government Carbon Budgets.

10.11.4. The Proposed Development will generate an estimated 57,586 tCO_2e over its operation phase, compared to the site-specific emissions baseline. The GHG emissions from the operation of the Proposed Development do not contribute more than 0.0005% to any of the UK Government Carbon Budgets.

10.11.5. No additional mitigation is proposed but recommended as GHG emissions should be mitigated as much as possible.

10.11.6. Therefore, the construction phase of the Proposed Development is considered to have a minor, non-significant effect on the climate. Therefore, the operation phase of the Proposed Development is considered to have a minor, non-significant effect on the climate.

Table 10-8 – Summary of effects

Resource / Receptor / affected group	Sensitivity of receptor	Activity or impact	Embedded design mitigation	Effect Magnitude Type Spatial extent Duration Likelihood	Significance of effect	Additional mitigation	Residual effect
Construction							
Atmosphere	High	Release of GHG emissions	Carbon reduction hierarchy to improve design	Adverse Minor Direct Global Permanent Certain	Non-significant	None required but further mitigation should be considered	Non-significant
Operation							
Atmosphere	High	Release of GHG emissions	Carbon reduction hierarchy to improve design	Adverse Minor Direct Global Permanent Certain	Non-significant	None required but further mitigation should be considered	Non-significant

10.12. Glossary and Acronyms

Table 10-9 – Glossary and acronyms

Term	Definition
ES	Environmental Statement
DEFRA	Department for Environment Food and Rural Affairs
Greenhouse Gas (GHG)	Gases that absorb infrared radiation emitted from the Earth's surface and reradiate it back to the Earth's surface. Seven GHGs are recognised under the Kyoto Protocol: Carbon dioxide, Methane, Nitrous oxide, Hydrofluorocarbons, Perfluorocarbons, Sulphur hexafluoride, Nitrogen trifluoride.
ICE	Inventory of Carbon and Energy
IEMA	Institute of Environmental Management and Assessment
LCA	Life-Cycle Assessment
RFFP	Reasonably Foreseeable Future Projects
RICS	Royal Institution of Chartered Surveyors
PAS 2080	Publicly Available Specification 2080:2023 Carbon management in buildings and infrastructure. A global standard for managing carbon across organisations

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