Chapter 9: Climate Change

Climate Change		
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SUPPORTING APPENDIX	**ES Volume 3: Appendix: Climate Change:** **Annex 1 – Climate Change Technical Note**.	
KEY CONSIDERATIONS	This ES chapter covers: • An assessment of the likely significant impacts of climate change on the resilience of the Proposed Development during construction and operation; and • An assessment of the likely significant impacts of the Proposed Development on the environment with regard to climate change through the direct and indirect release of greenhouse gas (GHG) emissions during construction and operation; and • A summary of the in-combination climate change resilience impacts of the Proposed Development.	
CONSULTATION	An EIA Scoping Report was prepared and submitted to the London Borough of Tower Hamlets (LBTH) in August 2021 to request an Environmental Impact Assessment (EIA) Scoping Opinion on the proposed scope of the EIA. The following comments were made by LBTH in their Scoping Opinion and are addressed in the ES chapter.	
	LBTH Scoping Opinion	**Where this is Addressed**
	Paragraph 165 of the Scoping Report states that no detailed assessment is proposed to be provided for inter-project cumulative effects. LBTH agrees that a detailed assessment accounting for all proposed developments in the area that may have a cumulative effect with the Proposed Development is not required. Given that the level of significance of effect should be determined against local emissions targets and compared against UK wide budgets, LBTH expects cumulative schemes to be assessed qualitatively, based on a broad assumption that by their nature, the cumulative schemes are expected to be major developments of a similar scale to the Proposed Development. This will enable a Cumulative Effects Assessment based on a worst-case scenario.	A cumulative GHG assessment has been addressed qualitatively. See **paragraph 9.111-9.113**
	The Aberfeldy New Village LLP ('the Applicant') presents the UK Climate Change Projections 2018 (UKCP18)[1] future climate change projections relative to the 1981-2000 baseline period under the representative concentration pathways (RCP8.5) within **Table 4** of the Scoping Report. LBTH expects that the RCP8.5 emissions scenario of UKCP18 will be used in the assessment. In accordance with guidance, the consideration of climate change should use RCP8.5 emissions scenario, at a 50% certainty level.	The high RCP8.5 emission scenario with a 50% certainty level has been used for a set of key climate change parameters.
	All climate change resilience and adaption measures should be included within the **Environmental Statement (ES) Volume 1, Chapter 17: Mitigation and Monitoring Schedule**, and consideration should be given to producing a Climate Change Resilience and Adaptation Plan in accordance with Institute of Environmental Management and Assessment (IEMA) EIA Guide to Climate Change Resilience and Adaptation (2020) [2].	Climate change resilience and adaption measures are included within **ES Volume 1, Chapter 17: Mitigation and Monitoring Schedule.**
	The Applicant should assess GHG emissions quantitatively; any use of professional judgement to assess significance should be fully justified. All references to carbon emissions should refer to carbon dioxide (CO_2) or carbon dioxide equivalent (CO_{2e}) and not carbon alone.	The assumptions and limitations on which this ES chapter are based are presented in **paragraphs 9.21 – 9.23**. All references to carbon emissions refer to carbon dioxide (CO_2) or carbon dioxide equivalent (CO_2e) and not carbon alone.
	In accordance with IEMA EIA Guide to: Assessing GHG Emissions and Evaluating Their Significance (2017), all GHG emissions are to be considered as significant. The level of significance of effect should be determined against local emissions targets and compared against the UK wide budgets, based upon professional judgement. The Applicant is reminded that all likely significant effects must be stated in the Non-Technical Summary.	**Table 9.2** and Table 9.3 present the levels of significance for the GHG effect criteria and Receptor Sensitivity, Probability and Consequence Factors. The potential effects for each sector have been attributed a level of significance according to these tables.
	The GHG assessment is to cover all phases of the project lifespan, from demolition and enabling works through to end of life (including decommissioning as the end-of-life stage). Where professional judgement has been used, this should be made clear with any assumptions and reasoning explicitly stated.	The GHG assessment covers all phases of the project lifespan, from demolition and enabling works through to end of life. The assumptions and limitations on which this ES chapter are based are presented in **paragraphs 9.21 – 9.23**.
	Any further guidance published before submission of planning application, in addition to the guidance referenced within the Scoping Report, should be considered within the assessment.	No further guidance has been published.
	Mitigation measures to meet adopted and any emerging policy and will need to be secured within any given planning consent. Particular attention should be made to ensuring emission reduction measures are integrated and delivered through the construction and operation phases (e.g. selection of construction methodologies, selection and use of construction equipment and vehicles, and selection and transport of materials that have low embodied GHG emissions). As a Greater London Authority (GLA) referable scheme subject to London Plan Policy SI 2 and Policy SI 7, the findings of the Proposed Development's Whole Life Cycle Carbon Assessment and Circular Economy Statement should be referred to in the assessment.	Attention has been paid to emission reduction measures which are integrated and delivered through the construction and operation phases. The Whole Life Carbon Assessment and Circular Economy Statement has been referred to in this assessment.
	For the GHG emission assessment of the Proposed Development's operational phase, the EIA should set out how the Proposed Development will be net zero carbon on-site in 2050, as required by the Climate Change Act 2008 (as amended) and London Plan Policy SI 2. It should be noted that Policy D.ES7 within Tower Hamlets Local Plan 2031: Managing Growth and Sharing the Benefits (2020) requires residential development to achieve zero carbon. Reference in the ES should be made to whether the national, regional and local policy requirements in relation to energy and GHG are satisfied by the Proposed Development.	Energy efficient measures have been optimised for the Proposed Development and each step of the Energy Hierarchy followed to minimise carbon emissions. To achieve zero carbon, the remaining carbon emissions will be offset.

ASSESSMENT METHODOLOGY

9.1 The EIA Directive 2014[3] sets out the rationale for incorporating climate change into the EIA process. It states:

"Climate change will continue to cause damage to the environment and compromise economic development. In this regard, it is appropriate to assess the impact of projects on climate (for example GHG emissions) and their vulnerability to climate change."

9.2 The requirements of the EIA Regulations[4] require that ESs provide:

- "A description of the likely significant effects of the development on the environment resulting from, inter alia:
- (f) the impact of the project on climate (for example the nature and magnitude of GHG emissions) and the vulnerability of the project to climate change".

9.3 The IEMA EIA Guide to: Climate Change Resilience & Adaptation' also states that in combination climate impacts of a development should be assessed which are the impacts of climate change on receptors identified in other technical areas.

9.4 Therefore, this ES chapter covers:

[1] *Met Office, (2018); UK Climate Change Projections. (website: https://metoffice.gov.uk)*
[2] *IEMA (2020). EIA Guide to Climate Change Resilience and Adaption (website: https://www.iema.net)*
[3] *HMSO Town and Country Planning (Environmental Impact Assessment) Regulations 2014*
[4] *HMSO Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended 2018 and 2020)*

- An assessment of the likely significant impacts of climate change on the resilience of the Proposed Development during construction and operation and consideration of the adaptation measures that have been factored into the design of the Proposed Development;
- An assessment of the likely significant impacts of the Proposed Development on the environment with regard to climate change through the direct and indirect release of GHG emissions during construction and operation; and
- A summary of the in-combination climate change resilience impacts of the Proposed Development.

9.5 The assessment has followed guidance within IEMA EIA Guide to: Climate Change Resilience & Adaptation and IEMA guidance on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance'[5].

Defining the Baseline

9.6 Baseline data for the climate change impacts have been gathered using the United Kingdom's Climate Impact Programme to establish the climatic data surrounding current seasonal temperatures and precipitation. This stage of the assessment will be used to analyse the current climate and compare these findings, in relation to the Proposed Development, to the climate change projections identified in the UKCP18.

9.7 The UKCP18 have built on the 2009 UK Climate Change Projections (UKCP09) to deliver a significant upgrade to the range of the UK climate projections that assist decision makers in assessing their risk to climate. The projections form part of the Met Office Hadley Centre Climate Programme, which is supported by the Department of Business, Energy and Industrial Strategy and the Department for Environment, Food and Rural Affairs. The UKCP18 provides the most up-to-date assessment of how the climate in the UK may change over the 21st century.

9.8 The UKCP18 use a range of future emission scenarios to assess the different climate change scenarios. These emission scenarios include where global emissions of GHG rapidly peak and decline towards the climate targets in the Paris Agreement, to where fossil fuel use increases to even higher GHG emissions. The UKCP18 use representative concentration pathways (RCPs) that represent different levels of GHG concentrations in the future. For this assessment, the RCP8.5 emission scenario with a 50% certainty level has been used for a set of key climate change parameters. This scenario was selected in accordance with IEMA Guidance on assessing climate change resilience as the most conservative scenario to ensure all potential risks are addressed.

9.9 In addition, the UK Climate Change Risk Assessment: Government Report (CCRA)6 outlines how well-established risk-based decision approaches to assess risks have been applied to climate change and what priority actions are needed and how to respond to these. The CCRA report sets out the main priorities for adaptation in the UK under five key themes identified in the CCRA Evidence Report:

- Agriculture and Forestry;
- Business;
- Health and Wellbeing;
- Buildings and Infrastructure; and
- Natural Environment.

9.10 Baseline data for the GHG part of the assessment is from a number of assumptions, as outlined in **Table 9.1**.

Table 9.1 GHG Baseline Sources

Impact	Baseline Assumptions
Construction	Baseline is zero as no existing construction is taking place
Operational energy use (regulated)	Assumed to be zero as a worst case scenario
Operational Transport	Assumed to be zero as a worst case scenario

[5] *IEMA (2017); Assessing Greenhouse Gas Emissions and Evaluating their Significance. (website: https://www.iema.net)*

[6] *Department for Environment, Food and Rural Affairs, (2017); UK Climate Change Risk Assessment: Government Report. (website: https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2017)*

Impact Assessment Methodology

Demolition and Construction

9.11 For the climate change resilience assessment, Demolition and Construction impacts have been scoped out given the low magnitude of change predicted during the construction period.

9.12 For the GHG assessment the A1-A5 construction stage embodied carbon emissions (from product, transport and construction operations stage) have been taken from the Whole Life-Cycle Carbon Assessment.

9.13 IEMA recommend that all GHG emissions are significant and that their occurrence must be addressed by taking mitigation actions. The GHG emissions during both construction and operation have been considered in the context of the CO_{2e} emissions for the LBTH as published within the London Energy and Greenhouse Gas Inventory (LEGGI) (2018)[7]. In the absence of an established universal methodology to determine the level of significance of different sources of GHG emissions, the criteria used in the **Table 9.2** have been used to determine the effect of emissions relative to the CO_{2e} emissions from LBTH in 2018. As extracted from LEGGI calculations, the total emissions for LTBH amount to 1,137,000t CO_2 per annum.

Table 9.2 GHG Effect Criteria

Significance	Criteria
Major Adverse / Beneficial	Major increase (adverse) or decrease (beneficial) (above 1%, 11,370t CO_{2e}) in annual LBTH emissions
Moderate Adverse / Beneficial	Moderate increase (adverse) or decrease (beneficial) (above 0.1%, 1,137t CO_{2e}) in annual LBTH emissions
Minor Adverse / Beneficial	Minor increase (adverse) or decrease (beneficial) in GHG emissions below (0.1%, 1,137t CO2e) in annual LBTH emissions

Completed Development – Climate Change Resilience

9.14 In terms of climate change risk to the Proposed Development, there are also no standard significance criteria. Therefore, specific project criteria have been used to determine the significance of effect in line with the IEMA Climate Change Resilience Guidance.

9.15 Each impact identified has been assessed against three variables (as shown in Table 9.3) - Receptor sensitivity (Rs); Probability (P); and Consequence (C) of the risk.

9.16 Using this methodology, each risk is assigned a score (Total Risk Score = Rs x P x C) between 1 (no or very low risk) and 27 (very high risk) for three separate time periods as set out in the UKCP18:

- 2030s;
- 2060s; and
- 2090s.

9.17 Scoring risks against three different timescales provides an indication of when action may need to be taken to adapt and increase resilience so the asset in question is able to perform effectively for its intended useful design life. For some risks, action should be taken early to avoid significant disruption and economic impact. Other risks only need to be addressed either shortly before or as they occur. For example, the risk of severe and widespread flooding may need to be addressed early through planning and design activities (such as installing high drainage capacities and flood protection). In contrast, when considering the resilience of road surfaces to extreme weather events, adaptive management is a more suitable approach as this allows resilience to be built into a project when necessary during ongoing maintenance or replacement.

9.18 The scores for Rs, P and C are established through the understanding of the specific risk and the level of resilience or exposure of the Proposed Development to climate change and through a review of relevant literature and climate change data. These significance criteria have been adapted from the IEMA Climate Change Resilience Guide. These are shown in **Table 9.3**.

- Total Risk Scores (Rs x P x C) are categorised as follows:

[7] *Greater London Authority (2018), London Energy and Greenhouse Gas Inventory (LEGGI). (website: https://data.london.gov.uk/dataset/leggi)*

- Total Risk Score of 18-27 – Very High Risk for the specified time period (Major Adverse Effect, Significant);
- Total Risk Score of 12-17 – High Risk for the specified time period (Moderate Adverse Effect, Significant);
- Total Risk Score of 8-11 – Medium risk for the specified time period (Minor Adverse Effect, Significant); and
- Total Risk Score of <8 – Low Risk for the specified time period (Negligible Effect).

Table 9.3 Receptor Sensitivity, Probability and Consequence Factors

Significance	Criteria
Rs – the sensitivity of the receptor / receiving environment is the degree of response of a receiver to a change and a function of its capacity to accommodate and recover from a change if it is affected. This considers the susceptibility of the receptor and the vulnerability of the receptor to potential climate effects.	1 = Low susceptibility and / or vulnerability. 2 = Moderate susceptibility and / or vulnerability. 3 = High susceptibility and / or high vulnerability.
P – likelihood of the impact occurring over the specified time period.	1 = Unknown occurrence or relatively low probability of the impact occurring in project lifetime. 2 = Medium likelihood that the impact will occur in the lifetime of the project. 3 = There is a high likelihood that the impact will occur multiple times in the project lifetime.
C - This reflects the geographical extent of the effect or the number of receptors affected (e.g. scale), the complexity of the effect, degree of harm to those affected and the duration, and frequency of effect.	1 = No or minimal consequence e.g. effect is small in scale relative to the project, results in no harm and has a short duration (e.g. 1 day). 2 = Moderate consequence, must meet one of the following thresholds: • Results in some level of harm; or • Medium scale effect that has some potential for cascading effects on other aspects of the Proposed Development. • 3 = High consequence, must meet one of the following thresholds: • Longer duration (e.g. 1 week) effect on any aspect of the project; • Results in unacceptable harm; or • Large scale effect that has cascading effects on the wider function of the Proposed Development.

Completed Development – GHG Assessment

9.19 For the Completed Development, the GHG emissions have been based on the:

- Energy strategy of the Proposed Development and Whole Life-Cycle Carbon Assessment (B6) under the decarbonisation scenario for operational energy emissions; and
- Qualitative consideration of operational transport emissions based on net daily trip generation data for the Proposed Development provided by the transport consultant.

9.20 The significance of GHG emissions has been assessed based on **Table 9.2**.

Assumptions and Limitations

9.21 This chapter assesses the potential effects in terms of the adaptability and ability to mitigate the impact of climate change on the Proposed Development both during construction and upon completion into the operational phase. Therefore, it does not follow the standard assessment and approach for this EIA, and it is not possible to provide an assessment of any residual effects following adaptation and mitigation as there are scientific unknowns within the climate system. However, whilst the detail of the residual effects following adaptation cannot be stated, the adaptation measures identified are considered best practice in order to minimise the residual impact of climate change on the Proposed Development.

9.22 The UKCP18 projections of the future climate are based on the current understanding of the climate system; however, there may be scientific unknowns incorporated within the predictions that would affect the information provided. The data scenarios, therefore, should be interpreted as climate projections that will have some variance as models and observed impacts are recorded.

9.23 The data used from the Whole Life-Cycle Carbon Assessment is based on the decarbonisation scenario based on National Grid's Future Energy Scenario 2020 'Steady Progression'. This is therefore considered a realistic worst-case scenario although the GHG emissions from the Proposed Development would be lower if decarbonisation occurs more quickly.

BASELINE CONDITIONS

9.24 For the purpose of this assessment, the baseline for the GHG assessment is assumed to be zero as a worst case scenario.

9.25 The GHG assessment has also not identified any sensitive receptors as GHG emissions do not directly affect specific locations, but contribute to the global issue of climate change.

9.26 In terms of the impact of climate change on the Proposed Development, baseline conditions are set through the modelled datasets and climate projections and it is necessary to use the timescales set out within these datasets. Therefore, this assessment does not make use of the baseline year of 2020 as used in other assessments within this EIA, but instead uses baseline conditions relevant to the climate datasets used.

9.27 The UKCP18 highlights the key climate projections over the next 50+ years and summarises these as follows:

- Summers will become hotter and drier;
- Winters will become milder and wetter;
- Soils will become drier on average;
- Snowfall and the number of very cold days will decrease;
- Sea levels will rise; and
- Storms, heavy and extreme rainfall, and extreme winds will become more frequent.

9.28 These changes are set to have substantial impacts on the construction and maintenance of buildings and also on the natural environment. For example, drier and hotter summers will lead to more incidences of heat damage to structures and equipment; more frequent heavy rainfall events will result in increased incidences of flooding in low-lying areas; and increased variability in soil moisture levels will lead to increased incidences of subsidence. These impacts will lead to disruption to businesses and increased operational, maintenance and emergency repair costs.

9.29 In order to assess the climate change resilience impacts to the Proposed Development, future climate projections under UKCP18 for the 25 km Grid Cell (537500, 187500) within which the Site is located, are presented in **Table 9.4**for the 2030s, 2060s and 2090s[8]. The high emissions scenario RCP8.5 was used and projections for the 50th percentile under both scenarios are displayed. The wider range shows the range of projections for the 5th percentile to 95th percentile under each climate variable. These projections within **Table 9.4** indicate the changes in temperature and precipitation for the projected years (2030s, 2060s and 2090s).

[8] *UK Climate Projections User Interface, (2018); Plume of time series anomalies for probabilistic projections (25km) over UK, 1961-2100. (website: https://ukclimateprojections-ui.metoffice.gov.uk/ui/home)*

Table 9.4 UKCP18 Future Climate Change Projections Relative to 1981-2000 Baseline Period under RCP8.5

Climate Variable	Change relative to 1981-2000 base period					
	2030s		2060s		2090s	
	RCP8.5 (50th percentile)	Wider range	RCP8.5 (50th percentile)	Wider range	RCP8.5 (50th percentile)	Wider range
Mean Air Temperature Anomaly at 1.5m (°C)						
Annual Average	+1.0 °C	0.2 – +2.0 °C	+2.4 °C	0.8 – +4.1 °C	+4.2 °C	1.7 – +7.0 °C
Winter Average	+0.9 °C	-0.3 – +2.2 °C	+2.1 °C	0.2 – +4.1 °C	+3.6 °C	0.8 – +6.5 °C
Spring Average	+0.7 °C	-0.3 – +1.7 °C	+1.7 °C	0.3 – +3.3 °C	+3.0 °C	0.8 – +5.5 °C
Summer Average	+1.3 °C	0.1 – +2.6 °C	+3.1 °C	0.6 – +5.7 °C	+5.6 °C	1.8 – +9.8 °C
Autumn Average	+1.1 °C	-0.4 – +2.6 °C	+2.4 °C	0.5 – +4.6 °C	+4.4 °C	1.4 – +7.7 °C
Maximum Air Temperature Anomaly at 1.5m (°C)						
Annual Average	+1.1 °C	0.2 – +2.2 °C	+2.6 °C	0.7 – +4.5 °C	+4.5 °C	1.5 – +7.7 °C
Winter Average	+1.0 °C	-0.3 – +2.2 °C	+2.0 °C	0.3 – +3.9 °C	+3.4 °C	0.8 – +6.2 °C
Spring Average	+0.9 °C	-0.4 – +2.2 °C	+2.0 °C	0.2 – +3.8 °C	+3.6 °C	0.6 – +6.6 °C
Summer Average	+1.4 °C	0.0 – +3.1 °C	+3.5 °C	0.4 – +6.8 °C	+6.3 °C	1.3 – +11.7 °C
Autumn Average	+1.3 °C	-0.2 – +2.9 °C	+2.7 °C	0.1 – +5.5 °C	+4.6 °C	0.7 – +9.0 °C
Minimum Air Temperature Anomaly at 1.5m (°C)						
Annual Average	+0.9 °C	-0.1 – +2.1 °C	+2.3 °C	0.6 – +4.2 °C	+4.1 °C	1.3 – +7.3 °C
Winter Average	+0.9 °C	-0.4 – +2.2 °C	+2.1 °C	0.1 – +4.4 °C	+3.5 °C	0.6 – +7.2 °C
Spring Average	+0.8 °C	-0.7 – +2.2 °C	+1.8 °C	0.1 – +3.5 °C	+3.2 °C	0.5 – +6.2 °C
Summer Average	+1.2 °C	0.2 – +2.3 °C	+2.8 °C	0.9 – +5.1 °C	+5.2 °C	1.8 – +9.0 °C
Autumn Average	+1.0 °C	-0.5 – +2.6 °C	+2.4 °C	0.2 – +5.0 °C	+4.4 °C	0.9 – +8.4 °C
Precipitation Rate Anomaly						
Annual Average	+1%	-6 – +9%	-3%	-13 – +8%	-2%	-12 – +8%
Winter Average	+7%	-8 – +24%	+13%	-11 – +40%	+23%	-6 – +57%
Spring Average	0%	-10– +10%	-4%	-19 – +10%	-7%	-26 – +14%
Summer Average	-8%	-39 – +24%	-24%	-61 – +14%	-39%	-78 – +9%
Autumn Average	+4%	-7 – +16%	-1%	-16 – +15%	+7%	-6 – +21%

9.30 **Table 9.4** above shows that the following changes in climate variables are predicted under the RCP8.5GHG emissions scenario) for the 2030s, 2060s and 2090s:

- Increased average air temperatures across all seasons;
- Higher increases in summer air temperature (associated with an increased frequency of heatwaves);
- Increased variability in precipitation (associated with an increased frequency of heavy rainfall events and droughts);
- An average reduction in summer precipitation (associated with an increased frequency of summer droughts); and
- An average increase in winter precipitation (associated with an increased frequency heavy rainfall and winter storms).

9.31 The magnitude and variability of these changes in climate variables increases over time with the biggest changes in the 2090s. The magnitude of these changes is likely to be lower if less global GHGs are emitted than in the RCP8.5 scenario.

9.32 Considering the nature of the Proposed Development and the climate change variables identified using the UKCP18 data, a set of risks for the Proposed Development have been identified as below:

- Flooding to the public realm and ground floor properties;
- Overheating of homes and commercial units and associated health implications;
- Soft landscaping failure and associated loss of services; and
- Water shortages for public use and for landscaping.

Evolution of the Baseline

9.33 In the absence of the Proposed Development, the existing buildings and landscaping infrastructure on-site would still be subject to the same changes in climate change variables as described above.

POTENTIAL EFFECTS

Demolition and Construction

9.34 The Whole Life-Cycle Carbon Assessment has identified that the Proposed Development is predicted to create 19,560 tonnes of CO_{2e} for the Detailed Proposals (Phase A), and 69,917 tonnes of CO_{2e} for the Outline Proposals (Phases B-D) through construction and upstream processes including A1-A3 Product Stage, A4 Transportation to site and A5 Site Operations.

9.35 This is equivalent to approximately 9,780 tonnes of CO_{2e} per annum for Detailed Proposals and 7,769 tonnes of CO_{2e} per annum for Outline Proposals, during the respective 2 and 9-year construction periods. The total emissions of the Proposed Development are 0.9% and 0.6% respectively of current annual LBTH emissions (see **Table 9.2**).

9.36 Therefore, this is considered to be a **Moderate Adverse (Significant)** impact.

Completed Development

Climate Change Resilience

9.37 To develop risks, the high emissions scenario data in **Table 9.4** was used to estimate the risk prior to any adaptation measures because this would present the worst-case scenario in terms of impact severity and therefore ensure that all risks were fully evaluated. Mitigation measures for the risks are identified in the mitigation section of this chapter.

9.38 Each of these risks has been estimated using the scoring methodology set out in **Table 9.3** and evaluated using the Rs x P x C calculation to produce an associated level of risk.

9.39 The results of the risk estimation and evaluation are displayed in **Table 9.5**.

Table 9.5 Total Risk Score of the Proposed Development

Risk	Timescale	Receptor sensitivity (Rs)	Probability (P)	Consequence (C)	Total Risk Score (Rs x P x C)	Risk
Flooding to public realm and ground floor properties (based on FRA)	2030s	3	1	2	6	Negligible
	2060s	3	2	2	12	Moderate Adverse
	2090s	3	2	2	12	Moderate Adverse
Overheating and associated health implications	2030s	3	2	2	12	Moderate Adverse
	2060s	3	3	3	27	Major Adverse
	2090s	3	3	3	27	Major Adverse
Soft landscaping failure and associated loss of services	2030s	2	1	2	4	Negligible
	2060s	3	2	2	12	Moderate Adverse
	2090s	3	2	2	12	Moderate Adverse
Water shortages for public use and landscaping	2030s	3	1	2	6	Negligible
	2060s	3	2	2	12	Moderate Adverse
	2090s	3	2	2	12	Moderate Adverse

9.40 Using the calculated risk scores in **Table 9.5**, impacts associated with climate change on the built environment at the Proposed Development will result in significant effects on the following areas:

- Flooding – **Moderate Adverse (Significant)** risk for 2060s and 2090s. The Site is located in Flood Zone 3a, an area benefiting from the presence of flood defences. A Flood Risk Assessment (FRA) was undertaken by Parmarbrook. The report concludes that the risk of flooding from surface water and ground water is very low for most of the Site, and there is an unlikely risk from reservoir flooding. The implementation of Sustainable Urban Drainage Systems (SuDS) will help mitigate the risk of surface water flooding onsite.
- Overheating – **Moderate Adverse (Significant)** risk for 2030s, **Major Adverse (Significant)** risk for 2060s and 2090s. With increased ambient and peak summer temperatures, this will increase the likelihood and severity of the overheating risk and the subsequent need for additional cooling. This will also affect local people and could have negative effects on their health;
- Increased water shortages – **Moderate Adverse (Significant)** risk for 2060s and 2090s – the Proposed Development will be affected by the increased likelihood of water shortages as a result of reduced total rainfall and increased severe rainfall. This will result in more surface water runoff and fewer opportunities for natural infiltration; and
- Soft landscaping failure – **Moderate Adverse (Significant)** risk for 2060s and 2090s – increased extreme weather events, such as heatwaves, droughts and storms, will cause damage to the extensive landscaping features if they have not been designed to withstand a reduced water balance and higher ambient temperatures.

GHG Assessment

Operational Energy

9.41 The CO_2 emissions from the regulated energy consumption of the Proposed Development have been sourced from the energy strategy. This uses the energy hierarchy to describe emissions savings through passive design, low carbon infrastructure and renewable energy sources. **Table 9.6** and **Table 9.7** show the CO_2 regulated emissions from the Proposed Development from each stage of the energy hierarchy.

Table 9.6 CO_2 Regulated Emissions from Detailed Proposals (Phase A)

Impact	CO2 (tonnes CO_2 / annum)
Baseline development	390.6
After energy demand reduction	310.9
After heat network	260.5
After renewable energy	206.6
% Improvement	47.1

Table 9.7 CO_2 Regulated Emissions from Outline Proposals (Phases B-D)

Impact	CO2 (tonnes CO_2 / annum)
Baseline development	1,496.7
After energy demand reduction	1,268.8
After heat network	1,268.8
After renewable energy	590.4
% Improvement	60.5

9.42 **Table 9.6** and **Table 9.7** respectively show that a 47% CO_2 saving over the Building Regulations baseline is achieved across the Detailed Proposals and 60.5% saving across the Outline Proposals, as a result of the different measures employed in the energy strategy. To achieve zero carbon, the rest of the emissions will be offset.

9.43 The unregulated CO_2 emissions from the Proposed Development are predicted to be 161 tonnes CO_2 per annum for the Detailed Proposals and 256 tonnes CO_2 per annum for the Outline Proposals, resulting in a total of 496 tonnes CO_2 per annum and 799 tonnes CO_2 per annum respectively from regulated and unregulated energy.

9.44 In terms of the significance of this impact, the GHG emissions have been compared to CO_{2e} emissions calculated for the LBTH and reported within the LEGGI (2018). Based on the Energy Statement, the total operational energy CO_2 emissions are 0.11% of the LBTH current annual emissions. This is considered a **Moderate Adverse (Significant)** impact.

Operational Transport

9.45 The operational transport GHG emissions from the Proposed Development are predicted to be **Negligible (Not Significant) to Minor Beneficial (Significant)** as the transport consultants, Velocity, have identified that the Proposed Development will have a net decrease in vehicle trips compared to the existing Site as a result of the proposed low residential parking ratio. Velocity have undertaken strategic modelling which assumed that there would be no change in traffic volume on the strategic network due to the Proposed Development and the only impact is the change to the network in the form of closing the underpass.

MITIGATION, MONITORING AND RESIDUAL EFFECTS

9.46 Whilst the design approach to mitigation is provided in this chapter, other chapters and accompanying reports should be read, in particular:

- Construction Environmental Management Plan (CEMP);
- Waste Management Strategy;
- Energy Strategy and Overheating Statement;
- Whole Life-Cycle Carbon Assessment;

- Sustainability Statement;
- Circular Economy Statement; and
- Flood Risk Assessment.

Demolition and Construction Mitigation

9.47 There are two potentially significant effects on climate change during the construction phase of the Proposed Development. These are as follows:

- GHG emissions from construction activities; and
- GHG emissions from construction materials.

Greenhouse Gas Emissions from Construction Activities

9.48 Through the use of a CEMP, the following measures will be implemented during the construction phase to reduce GHG emissions from the construction works:

- All construction vehicles are required to switch off their engines when stationary, as well as equipment being switched off when not in use, to prevent exhaust emissions;
- Regular maintenance and servicing of vehicles, equipment and plant; and
- Through the implementation of a Travel Plan construction workers will be encouraged to use public transport through the Site induction and information on site noticeboards.

Greenhouse Gas Emissions from Construction Materials

9.49 The Proposed Development will aim to 'design out' waste through the consideration of materials specification and construction techniques. A Site Waste Management Plan will be used to reduce waste being sent to landfill, increasing reuse and recycling. This will minimise waste generation and also reduce the total material use, thus reducing the embodied emissions within the materials.

9.50 Material procurement will be undertaken with sustainable principles in mind including use of products with low embodied energy, high recycled content and the use of local materials wherever possible to reduce emissions associated with their transport.

9.51 By using low-carbon building materials and reducing the overall use of materials, in line with GLA benchmarks[9], the overall embodied carbon of the scheme will be reduced. The Proposed Development will incorporate recycled content within all rebar steel as well as Ground Granulated Blast-furnace Slag within the cement to reduce the embodied carbon of the scheme.

9.52 The strategic Circular Economy approach for the new build elements of the scheme is to design for longevity (the estimated life of the scheme will be in excess of 70 years), a high degree of standardisation (subject to some specific listed building requirements) and to ensure that material use is responsible and low impact.

9.53 Following the mitigation measures described above, the residual GHG impact of the Proposed Development during construction is predicted to remain **Minor Adverse (Significant)**.

Completed Development Mitigation

Climate Change Resilience

9.54 Adaptation measures to address the significant risks must be developed. These measures have been assessed to understand their suitability for implementation and potential ability to reduce the level of risk severity and to increase the operational and economic resilience of the Proposed Development.

9.55 Adaptation measures were incorporated into the design for the following significant risks:

- Flooding;
- Overheating in homes;
- Risk to soft landscaping features; and
- Water shortage.

[9] *Greater London Authority (2020); Whole Life-Cycle Carbon Assessment Guidance Pre-Consultation Draft.*

Flooding

9.56 To mitigate risk from tidal / fluvial flooding, finished floor levels of the residential units will need to be raised above the peak flood levels in the 2100 climate change breach scenario, and a minimum of 0.15m above adjacent ground levels. For the Retail Development the Finished floor levels of the proposed units should be set a minimum of 0.15m above adjacent ground levels.

9.57 In order to manage surface water flood risk onsite, the Proposed Development will include site-specific SuDS consisting of below ground cellular attenuation tanks and blue roofs where feasible, which will attenuate surface water runoff to rates of 1l/s, 1.25l/s and 1.5l/s before discharging to the nearby Thames Water sewer.

9.58 Green roofs are proposed across the Proposed Development, which will assist in intercepting and retaining precipitation falling on them. The surface water drainage strategy has been designed to limit surface water runoff from the Site via a Hydro-brake system or similar, to a rate of maximum 1.5l/s, in accordance with the borough's requirements for all storm events up to a 1 in 100 year plus 40% climate change allowance.

Overheating in Homes

9.59 Meinhardt has undertaken an Overheating Risk assessment for the Proposed Development.

9.60 The building construction is a highly efficient envelope and utilises solar control glazing with a low G value to maximise daylight while minimising solar gain. The glazed areas have been optimised to give the desired balance between good daylighting and minimising solar gains. Highly efficient lighting is used to further minimise internal heat gains.

9.61 Residential units will be designed with dual aspect where possible and have openable windows where possible to provide passive ventilation via cross ventilation and therefore minimise overheating risk.

9.62 Through the use of natural ventilation and increased mechanical ventilation together with low g-value, the results of the dynamic modelling analysis for residential areas show that most rooms comply with the CIBSE criteria for the 2020s DSY1 weather scenario.

9.63 As detailed further below, the roof gardens, green infrastructure and planting will provide an element of natural cooling.

Risk to Soft Landscaping Features

9.64 An extensive landscaping strategy, illustrative for the Outline Proposals and detailed for the Detailed Proposals, has been designed for the Proposed Development including communal roof gardens, biodiverse roofs, green walls and ground planting including new trees. The plant species will be selected so that they are resilient to variations in climate.

9.65 Irrigation equipment will be provided on all the roof gardens so that planting does not dry out during the summer months, and it will therefore be able to provide its full range of functions to maximum effect.

Water shortage

9.66 As described above, water shortages have been partially mitigated by the attenuation tank and blue roofs provided to store water.

9.67 The Proposed Development will specify low water use fittings and appliances such as dual flush WCs, aerating washbasin taps and flow regulated showers to limit water consumption to a maximum of 105l per person per day for the residential units.

9.68 The use of rainwater and greywater harvesting technologies will be investigated, for internal use and external use (e.g. irrigation).

GHG Assessment

Energy Efficiency

9.69 The energy strategy has set out a number of measures that will be implemented in the Proposed Development to improve the energy efficiency and subsequently reduce emissions and therefore the Proposed Development's effect on climate change.

- The building fabric u-values will be enhanced and air permeability kept as low as possible to reduce energy consumption from the building fabric;

- Most of Aberfeldy Village Masterplan will be connected to the existing energy center for hot water and space heating;
- Buildings I and J will have their own air source heat pump system to provide hot water and space conditioning; and
- Light-emitting diode (LED) lighting will be fitted throughout.

9.70 Following the mitigation measures described above, the residual GHG impact of the Proposed Development from operational energy usage is predicted to remain **Moderate Adverse (Significant)**.

Operational Transport

9.71 The operational Proposed Development has been designed to minimise GHG emissions from transport by encouraging the use of more sustainable forms of transport particularly given the highly accessible location of the Proposed Development. Key transport mitigation measures that will reduce GHG emissions include:

- Develop a network of permeable walking and cycling routes that connect with surrounding existing and planned neighborhoods;
- Change the nature of Abbott Road with traffic calming and an improved walking and cycling experience;
- Provide good access to public transport network;
- Design streets that safely provide access and space for servicing the proposed buildings;
- Provide cycle parking in line with the current standards in the London Plan, and in accordance with Transport for London's London Cycling Design Standards;
- Low residential parking ratio (0.20 spaces per dwelling);
- Provision of electrical vehicle charging points across the Site in accordance with London Plan requirements; and
- Implementation of the Travel Plan.

9.72 Following the mitigation measures described above, the residual GHG impact of the Proposed Development from operational transport usage is predicted to remain **Negligible (Not Significant)** to **Minor Beneficial (Not Significant)**.

Residual Effects

9.73 All of the residual effects resulting from the Proposed Development, are presented in **Table 9.8**, identifying whether the effect is significant or not. As explained within the 'Assumptions and Limitations section', the usual ES significance ratings are not followed for climate change resilience impacts and as such, not all sections of the table are applicable.

Table 9.8 Residual Effects

Receptor	Description of the Residual Effect	Scale and Nature	Significant / Not Significant	Geo	D I	P T	St Mt Lt
Demolition and Construction							
Climate System	Construction emissions	Minor Adverse	**Significant**	N	D	T	Lt
Completed Development							
Future site users	Overheating	Minor Adverse for 2030s, 2060s and 2090s	**Significant**	L	D	P	Lt
Future site users	Flooding	Negligible for 2030s and 2060s, Minor Adverse for 2090s	**Significant**	L	D	P	Lt
Landscaping	Landscaping failure	Negligible for 2030s, Minor Adverse for 2060s and 2090s	**Significant**	L	D	P	Lt
Future site users	Water shortages	Negligible for 2030s 2060s, and 2090s	**Significant**	L	D	P	Lt
Climate System	Operational Energy emissions	Moderate Adverse	**Significant**	N	D	P	Lt
Climate System	Operational Transport emissions	Negligible to Minor Beneficial	**Significant**	N	D	P	Lt

Notes:
Residual Effect
- Scale = Negligible / Minor / Moderate / Major
- Nature = Beneficial or Adverse

Geo (Geographic Extent) = Local (L), Borough (B), Regional (R), National (N)
D = Direct / I = Indirect
P = Permanent / T = Temporary
St = Short Term / Mt = Medium Term / Lt = Long Term
N/A = not applicable / not assessed

IN COMBINATION CLIMATE CHANGE EFFECTS

Socio-economics

9.74 In the context of the socio-economics assessment, climate change related factors will have little direct influence on the baseline conditions and on the effects of the Proposed Development. Furthermore, there is no robust evidence that could be used to quantify the direct impacts of a changing climate on socio-economic indicators (including the economy and employment). These impacts would occur over a long period and would affect the activity generated by the Proposed Development in ways which are dependent on both the nature of the climate change impact and the type of business and employment.

9.75 Climate change will generate both economic opportunities and disbenefits. For instance, the management of climate change impacts is likely to see the development of new business activities relating to mitigation technologies and the process of adaptation. Conversely, business costs may rise as a result of impacts including shifts to low or zero carbon transport technologies, rising energy costs as a transition to alternative energy sources accelerates, and increases in the costs of materials linked to scarcity effects. The combination of opportunities and disbenefits related to climate change cannot be measured at this point in terms of business activity and employment, however these are expected to be present.

9.76 The health of the local population and employees both within the Proposed Development and across the impact areas may be adversely affected by increased risk of overheating and other heat-related illnesses, drought, in addition to decreased water and food security. This would be partially offset against a reduced risk of cold weather-related illness in the winter, particularly amongst vulnerable groups such as the elderly. Increased rainfall over short periods may also lead to increased numbers of bacteria in surface water with detrimental effects on drinking water.

Table 9.9 Summary of Receptor Sensitivity and Vulnerability for Assessment

Resource / Receptor	Sensitivity	Vulnerability
Demolition and Construction Phase		
Loss of existing, on-site residential	Low	Low
Loss of existing, on-site employment	Low	Low

Temporary employment as a result of Demolition and Construction	Medium	Low
Operations Phase		
Contribution to housing targets	High	Low
Population and labour market	Low	Low
On-site employment	Medium	Low
Off-site/ wider employment	Medium	Low
Local economy (GVA)	Medium	Low
Early years provision	Low	Low
Primary school capacity	Medium	Low
Secondary school capacity	Low	Low
General Practitioner (GP) capacity	High	Low
Open space	Medium	Low
Play space	Low	Low
Community Centres	Medium	Low
Deprivation	High	Low
Crime and social cohesion	Medium	Low

9.77 As shown in **Table 9.9** above, the receptors accounted for within the assessment are of low vulnerability to the impacts of climate change, and therefore it is considered that there would be no material change to the effects and / or significance conclusions presented within this assessment as a result of the climate scenario considered. Furthermore, this means that there is no need for any additional mitigation measures to be implemented.

Traffic and Transport

9.78 In the context of the socio-economics assessment, climate change related factors including changes in ambient temperature, rainfall, wind and cloud cover will not have a direct effect on the following transport effects considered within this Environmental Statement:

- Severance;
- Pedestrian and cyclist delay;
- Vehicle and bus delay;
- Amenity; and
- Fear and intimidation.

9.79 People travelling to and from the Proposed Development will be sensitive to the effects of climate change. **Table 9.10** shows the receptor sensitivities and vulnerabilities for the assessment of climate change.

Table 9.10 Summary of Receptor Sensitivity and Vulnerability

Receptor	Sensitivity	Vulnerability to Climate change
Vehicle passengers	Low	Medium - the effects of climate change are likely to have some impact on receptors travelling to and from the Proposed Development by vehicle
Bus passengers	Medium	Medium - the effects of climate change are likely to have some impact on receptors travelling to and from the Proposed Development by bus
Cyclists	High	High – the effects of climate change are likely to have a high level of impact on receptors travelling to and from the Proposed Development by cycle
Pedestrians	High	High – the effects of climate change are likely to have a high level of impact on receptors travelling to and from the Proposed Development on foot.

9.80 The mitigation measures discussed in **ES Volume 1, Chapter 17: Mitigation and Monitoring** within will also mitigate against the effects of climate change in the future:

- The Delivery and Servicing Plan will act to reduce the number of vehicles travelling to and from the Proposed Development; and
- The Travel Plan will act to encourage travel to and from the Proposed Development by a sustainable mode of transport, including provisions for cargo cycle deliveries.

Air Quality

9.81 Increased ambient temperatures and alterations in precipitation patterns have the potential to alter the concentration fine particulate matter ($PM_{2.5}$) and particulate matter (PM_{10}) during construction and operation. Summer droughts may exacerbate pollutant concentrations. During construction, the magnitude of these climate effects will be not significant and best practice measures will be implemented to minimise dust through the implementation of the CEMP.

9.82 During operation, Nitrogen Oxides (NO_x) concentrations are unlikely to be directly affected directly by increased ambient temperatures and future climate change. However, hot dry summers could exacerbate $PM_{2.5}$ and PM_{10} concentrations although this will not alter the Positive operational impact of the Proposed Development. Therefore, no in-combination climate change effects are predicted.

Noise and Vibration

9.83 Taking into account the predicted future climate change variables of relevance to this assessment (namely temperature; precipitation; wind; and cloud cover), it is considered that the sensitivity of the receptors will not alter from that defined within this assessment as a result. The assessment would not be affected by the climatic variables, and therefore the conclusions of this assessment are also not considered to be altered by climate change.

Archaeology (Buried Heritage)

9.84 With regards to archaeology, the only climate variable of relevance would be the groundwater level. The level of the water table has the potential to preserve organic remains if those remains on the Site and any change to the water table, especially its reduction has the potential to negate the preservation of organic remains.

9.85 Based on future climate projection data (**ES Volume 3, Appendix: Climate Change, Annex 1**), London in particular is due to experience drier summers with a reduction in rainfall. If there was an overall reduction in rainfall, there is the potential for the water table to reside at a level lower to its current position. As such any currently preserved organic remains may decay if the water table were reduced for prolonged periods of time.

Water Resources, Flood Risk and Drainage

9.86 The Drainage Strategy and FRA considers the government's latest climate change guidance. This is an inherent part of the design when considering drainage strategies, whereby a 40% climate change allowance has been made as part of the SuDS and surface water Attenuation Strategy. The FRA also considers climate change in line with the government's latest climate change guidance for Fluvial / Tidal and Sea level rises to ensure compliance under National Policy Programme Framework and in line with the Environment Agency guidance / requirements.

Wind Microclimate

9.87 The 'Climate Projects Report' published by UKCP18[10] presented the probable changes in wind speeds for the 2070-2099 period (timeframe considered most relevant for urban regeneration projects) in both the summer and winter seasons (see Climate Change Technical Note presented within **ES Volume 3, Climate Change – Annex 1**

9.88 As set out in **ES Volume 3, Climate Change – Annex 1,** the current trends in the climate change are not likely to have any significant effects on the predicted wind microclimate conditions in and around the Proposed Development. It is therefore not necessary to provide a quantitative analysis of the increase in storm frequency and its implication on the effect on the wind microclimate for the Proposed Development.

[10] *Updated future climate projections data have been published by the Met Office (UKCP18) in November 2018. UKCP18 probabilistic data for wind is not available. For this reason, UKCP09 wind data has been used.*

Daylight, Sunlight Overshadowing and Solar Glare

Daylight

9.89 Following the guidance published by Building Research Establishment (BRE), daylight assessments are carried out under an assumed overcast sky.

9.90 The methodologies used to quantify the levels of daylight are the Vertical Sky Component (VSC) or No-Sky Line (NSL). Of these, none are explicit measurements of light but rather the VSC is expressed as percentages of the total amount of light received at an unobstructed location. The NSL by contrast is a percentage of the room that can see the sky.

9.91 Being percentages, the daylight assessments above do not depend on the absolute amount of daylight outside and, since they also assume an overcast sky, they are independent of the cloud coverage or the annual number of sunlight hours.

9.92 By following the current BRE Guidelines methodology, therefore, the numeric daylight results are not affected by changes in climate.

9.93 Climate change projections (**ES Volume 3, Appendix: Climate Change – Annex 1**) suggests that the average cloud coverage be slightly reduced, although no information is provided on how this would affect global and diffuse illuminance and irradiance levels. Whilst the relationship between cloud cover and daylight illuminance is not defined as part of the projections it is probably reasonable to assume as cloud coverage is reduced, the overall amount of usable daylight increases. However, this would not impact the conclusions within this report which are based on numeric daylight assessments.

9.94 Therefore, the current BRE Guidelines criteria and the results of the associated daylight assessments are not influenced by, nor would they be altered by climate change.

Sunlight

9.95 To quantify the amount of sunlight that a residential window can be expected to receive throughout the years, Annual Probable Sunlight Hours (APSH) are used. This is a set of 100 fixed locations in the sky representing possible sun positions throughout the year.

9.96 The point locations were published by BRE Guidelines and are based on hourly sunlight availability. A change in climate that might result in more annual sunlight hours (currently 1481 in London) would not result in more than 100 APSH test points, since this is a fixed number.

9.97 If in a future revision of the daylighting guide, BRE Guidelines were to keep the current methodology but update the set of 100 reference points to reflect a slightly sunnier climate, it can be expected that the locations of the points on the sky dome may shift, whilst their overall number remain the same.

9.98 Therefore, an APSH assessment following the current methodology but relying on a (hypothetical) updated set of test points likely produce comparable but not necessarily identical results.

9.99 The future climate in the UK is likely to be somewhat sunnier, however, unless the BRE Guidelines methodology is changed, this would not be reflected in an APSH assessment.

9.100 Therefore, the current BRE Guidelines criteria and the results of the associated sunlight assessments are not influenced by, nor would they be altered by climate change.

Overshadowing

9.101 Overshadowing assessments are undertaken through either a Transient Overshadowing or Sun Hours on Ground assessment. These can be undertaken on any day of the year although the equinox is most common.

9.102 The assessment assumes a day with no cloud cover and so the maximum potential sunlight is assessed. From the climate projections, the future climate in the UK is likely to be somewhat sunnier but unless the methodology is changed, this would not be reflected in an overshadowing assessment.

9.103 Therefore, the current BRE Guidelines criteria and the results of the associated overshadowing assessments are not influenced by, nor would they be altered by climate change.

Solar Glare

9.104 As with overshadowing, the solar glare assessment assumes a year with no cloud cover and so the maximum potential sunlight is assessed. From the climate projections, the future climate in the UK is likely to be somewhat sunnier but unless the methodology is changed, this would not be reflected in a solar glare assessment

ASSESSMENT OF THE FUTURE ENVIRONMENT

Evolution of the Baseline

9.105 The existing Site currently comprises a range of uses including a large area of residential dwellings up to four storeys in height, public realm with soft landscaping, parks, hard landscaping, as well as retail and commercial businesses (along Aberfeldy Street), Aberfeldy Cultural Centre and the Aberfeldy GP Practice.

9.106 In the absence of the Proposed Development, and assuming existing services and drainage will not be replaced, it is expected that the Site would be prone to climate change risks in the future, as not built to the latest regulations and best practice thermal performance.

9.107 The existing buildings are likely to be exposed to higher levels of overheating and higher levels of water usage per unit compared to the Proposed Development.

9.108 Soft landscaping, not adapted to future climate, would also suffer from climate change. Whereas the Proposed Development landscaping strategy would include communal roof gardens, biodiverse roofs, green walls and ground planting including new trees. The plant species will be selected so that they are resilient to variations in climate.

9.109 The existing site would be more at risk of flooding from surface water, whereas a SuDS strategy has been designed for the Proposed Development, taking into account a climate change factor, to mitigate this risk.

Cumulative Effects Assessment

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

9.111 The EIA has identified 33 cumulative schemes in the assessment. It is difficult to quantify the GHG emissions from each of the 33 cumulative schemes and as discussed above cumulative contributions to climate change from GHGs will extend well beyond these 33 schemes. It is expected that mitigation will be provided, principally for operational energy and transport, which are policy compliant and work to minimise the on-site GHG emissions and reduce the lifetime GHG emissions of each cumulative scheme.

9.112 The residual cumulative GHG emissions from the 33 schemes and Proposed Development will likely be small in the context of regional and national GHG emissions, but as part of the wider cumulative effects of GHG emissions from all local, regional, national and global sources are nonetheless judged to be significant in accordance with IEMA guidance.

LIKELY SIGNIFICANT EFFECTS

9.113 The likely significant effects of the Proposed Development are described in **Table 9.7.** The assessment of the Proposed Development identified one likely significant effect during Demolition and Construction**,** such as a **Minor Adverse (Significant)** effect resulting from construction emissions at the national level.

9.114 Once completed, the following significant effects have been identified:

- **Minor Adverse (Significant)** effect resulting from future overheating during the 2030s, 2060s and 2090s at a local level;
- **Minor Adverse (Significant)** effect resulting from future flooding during the 2090s at the local level;
- **Minor Adverse (Significant)** effect resulting from future landscaping failure during 2060s and 2090s at a local level;
- **Negligible effect (Significant)** on future water shortages during the 2030s 2060s, and 2090s at a local level;
- **Moderate Adverse (Significant)** effect resulting from operational energy emissions at a national level; and
- **Negligible** to **Minor Beneficial** (Significant) resulting from future operational transport emissions at a national level.