



# THE GOODSYARD

Environmental Statement Addendum Volume 2

September 2019 – Chapter 18 of 21

ballymore.



# **CHAPTER 18: CLIMATE CHANGE MITIGATION AND ADAPTATION**

# 18.1 INTRODUCTION

- 18.1.1
- The 2015 Environmental Statement was prepared in line with the 2011 EIA Regulations<sup>1</sup> and their requirements which did not include the requirement for and assessment on climate change.
- 18.1.2
- In 2017 EIA Regulations<sup>2</sup> came into force which has a specific requirement to consider the effects associated with climate change. Whilst the Revised Scheme amends the existing 'live' applications and therefore in accordance with the GLA's requirements this ES Addendum has been prepared pursuant to the 2011 EIA Regulations, the Applicant, in the interests of best practice and robustness has prepared this ES Addendum to incorporate the requirements of the 2017 EIA Regulations which go over and above those in the 2011 EIA Regulations.
- 18.1.3
- In light of this the following climate change and adaption ES chapter has been prepared for inclusion within this ES Addendum.

# 18.2 SCOPE OF THE ASSESSMENT

- 18.2.1
- This chapter of the ES Addendum assesses the likely significant climatic effects of the Revised Scheme in terms of climate change and is supported by **ES Addendum Volume 4, Appendix E: Climate Change**.
- 18.2.2
- The chapter considers:

- climate change mitigation (i.e. acknowledging that all greenhouse gas emissions (GHGs) play a part cumulatively in climate change and identifying ways in which these can be reduced); and
  - climate change resilience (i.e. the measures the Revised Scheme will use to adapt to the manifestations of a changing climate).
- 18.2.3
- Please note that these two aspects are treated separately, except for the first part of the chapter which provides an overview of legislation, policy and guidance associated with climate change as a whole, and a combined residual effects section. The remainder of the chapter covers climate change mitigation and resilience separately, with both considering the assessment methodology; the baseline conditions/future baseline; the effects prior to mitigation; suggested mitigation (either greenhouse gas emission reduction or adaptation measures); and cumulative effects.
- 18.2.4
- The potential for impact interactions and combined impacts (Type 1 impacts) on ground conditions are discussed in Chapter 19: Effect Interactions. Combined cumulative ground conditions effects (Type 2 impacts) of the Revised Scheme with other development schemes are discussed later in this chapter.

# 18.3 KEY LEGISLATION, POLICY AND GUIDANCE

- 18.3.1
- The climate change assessment has been undertaken within the context of relevant planning policies, guidance documents and legislative instruments. These are summarised below.

Legislation and Regulation

Climate Change Act 2008
- 18.3.2
- The Climate Change Act 2008<sup>3</sup> sets up a framework for the UK to achieve its long-term goals of reducing greenhouse gas emissions by 34% over the 1990 baseline by 2020 and by 80% by 2050 and to ensure steps are taken towards adapting to the impact of climate change. The Act introduces a system of carbon budgeting which constrains the total amount of emissions in a given time period, and sets out a procedure for assessing the risks of the impact of climate change for the UK, and a requirement on the Government to develop an adaptation programme.
- 18.3.3
- The Act introduced new powers and duties on climate change adaptation and mitigation. For adaptation it established a:

- UK-wide Climate Change Risk Assessment that must take place every five years;
  - National Adaptation Programme which must be put in place and reviewed every five years to address the most pressing climate change risks;
  - Government power to require 'bodies with functions of a public nature' and 'statutory undertakers' - for example, water

<sup>1</sup> The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (SI 2011/1824).

<sup>2</sup> The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017/571).

<sup>3</sup> HMSO (2008): Climate Change Act 2008

- and energy utilities - to report on how they have assessed the risks of climate change to their work, and their response; and
- Adaptation Sub-Committee of the independent Committee on Climate Change (CCC) in order to oversee progress on the national programme and advise on the risk assessment.

## The UK Climate Change Risk Assessment 2017

- 18.3.4
- The Government and its Adaptation Sub-committee published the second UK Climate Change Risk Assessment (CCRA)<sup>4</sup> in January 2017, the five years after the first in 2012. The CCRA has drawn upon the evidence base<sup>5</sup> for a range of potential impacts of climate change in a UK context.
- 18.3.5
- In order to assess climate risks in a consistent way, and to facilitate action being focused on the most pressing risks, the Adaptation Sub-Committee took a three-step approach to assess the urgency of additional action for each climate risk and opportunity:

- considering the magnitude of the risk now and in the future;
  - taking into account policies and adaptation plans already in place to manage the risks; and
  - considering the potential benefits of further action.
- 18.3.6
- The Adaptation Sub-Committee's full Evidence Report comprises an overarching Synthesis Report, which summarises the conclusions of eight technical chapters and highlights priority risks across different sectors where additional action is recommended in the next five years.
- 18.3.7
- Figure 18.1** shows the 'urgency scores' for 56 individual risks and opportunities identified in the Evidence Report.
- 18.3.8
- Of particular relevance to the Revised Scheme are those relating to 'people and the built environment', which are considered later in this chapter.

## National Planning Policy Framework

- 18.3.9
- The NPPF 2019<sup>5</sup> describes ways in which the challenge of climate change can be met. It states that "new development should be planned for in ways that:

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.
- 18.3.10
- To help increase the use and supply of renewable and low carbon energy and heat, plans should:

a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);

b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers".
- <sup>4</sup> HM Government (2017): UK Climate Change Risk Assessment 2017
- ([https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/584281/uk-climate-change-risk-assess-2017.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/584281/uk-climate-change-risk-assess-2017.pdf))
- <sup>5</sup> Department for Communities and Local Government (2019): National Planning Policy Framework
- 1 ES Addendum Volume 2
- The Goodsyard

Figure 18.1 Findings of the CCRA Evidence Report

MORE ACTION NEEDED	RESEARCH PRIORITY	SUSTAIN CURRENT ACTION	WATCHING BRIEF
Ne1: Risks to species and habitats from changing climate space	Ne3: Changes in suitability of land for agriculture & forests	Ne9: Risks to agriculture, forestry, landscapes & wildlife from pests/pathogens/invasive species	Ne14: Risks & opportunities from changes in landscape character
Ne2: Opportunities from new species colonisations	Ne7: Risks to freshwater species from high water temperatures	Ne10: Extreme weather/wildfire risks to farming, forestry, wildlife & heritage	In7: Low/high riverflow risks to hydroelectric generation
Ne4: Risks to soils from increased seasonal aridity and wetness	Ne13: Ocean acidification & higher water temperature risks for marine species, fisheries and marine heritage	Ne11: Saltwater intrusion risks to aquifers, farmland & habitats	In8: Subsidence risks to buried/surface infrastructure
Ne5: Risks to natural carbon stores & carbon sequestration	In5: Risks to bridges and pipelines from high river flows/erosion	In13: Extreme heat risks to rail, road, ICT and energy infrastructure	In10: Risks to electricity generation from drought and low flows
Ne6: Risks to agriculture & wildlife from water scarcity & flooding	In11: Risks to energy, transport & ICT from high winds & lightning	In14: Benefits for infrastructure from reduced extreme cold events	PB3: Opportunities for increased outdoor activity in warmer weather
Ne8: Risks of land management practices exacerbating flood risk	In12: Risks to offshore infrastructure from storms and high waves	PB13: Risks to health from poor water quality	PB12: Risks of food-borne disease cases and outbreaks
Ne12: Risks to habitats & heritage in the coastal zone from sea level rise; loss of natural flood protection	PB2: Risks to passengers from high temperatures on public transport	PB14: Risk of household water supply interruptions	Bu4: Risks to business from reduced access to capital
In1: Risks of cascading infrastructure failures across interdependent networks	PB6: Risks to viability of coastal communities from sea level rise	Bu3: Risks to business operations from water scarcity	Bu7: Business risks /opportunities from changing demand for goods & services
In2: Risks to infrastructure from river, surface/groundwater flooding	PB7: Risks to building fabric from moisture, wind, and driving rain	Bu6: Risks to business from disruption to supply chains	It7: Opportunities from changes in international trade routes
In3: Risks to infrastructure from coastal flooding & erosion	PB8: Risks to culturally valued structures and historic environment		
In4: Risks of sewer flooding due to heavy rainfall	PB10: Risks to health from changes in air quality		
In6: Risks to transport networks from embankment failure	PB11: Risks to health from vector-borne pathogens		
In9: Risks to public water supplies from drought and low river flows	Bu2: Risks to business from loss of coastal locations & infrastructure		
PB1: Risks to public health and wellbeing from high temperatures	Bu5: Employee productivity impacts in heatwaves and from severe weather infrastructure disruption		
PB4: Potential benefits to health & wellbeing from reduced cold	It2: Imported food safety risks		
PB5: Risks to people, communities & buildings from flooding	It3: Long-term changes in global food production		
PB9: Risks to health and social care delivery from extreme weather	It5: Risks to the UK from international violent conflict		
Bu1: Risks to business sites from flooding	It6: Risks to international law and governance		
It1: Weather-related shocks to global food production and trade			
It4: Risks from climate-related international human displacement			

KEY TO CHAPTERS:

Chapter 3: Natural environment and natural assets

Chapter 4: Infrastructure

Chapter 5: People and the built environment

Chapter 6: Business and industry

Chapter 7: International dimensions

London Plan (2016)

- 18.3.11
- The London Plan, Spatial Development Strategy for London Consolidated with Alternatives since 2011, was published in March 2016<sup>6</sup>. It included a whole chapter entitled ‘London’s Response to Climate Change’ with 22 policies covering mitigation and adaption, energy supply and waste. The most relevant policies are set out as follows:

  - Policy 5.1 Climate Change Mitigation: “The Mayor seeks to achieve an overall reduction in London’s carbon dioxide emissions of 60% (below 1990 levels) by 2025. It is expected that the GLA Group, London boroughs and other organisations will contribute to meeting this strategic reduction target, and the GLA will monitor progress towards its achievements annually”;
  - Policy 5.2 Minimising Carbon Dioxide Emissions:

“A. Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy: 1 Be lean; use less energy 2 Be Clean: supply energy efficiently 3 Be green: use renewable energy.

B. The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019.

C. Major development proposals should include a detailed energy assessment to demonstrate how the targets for carbon dioxide emissions reduction outlined above are to be met within the framework of the energy hierarchy [...]”;

- Policy 5.3 Sustainable Design and Construction: “[...]”

B. Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.

C. Major development proposals should meet the minimum standards outlined in the Mayor’s supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles: a) minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems) b) avoiding internal overheating and contributing to the urban heat island effect c) efficient use of natural resources (including water), including making the most of natural systems both within and around buildings d) minimising pollution (including noise, air and urban runoff) e) minimising the generation of waste and maximising reuse or recycling f) avoiding impacts from natural hazards (including flooding) g) ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions h) securing sustainable procurement of materials, using local supplies where feasible, and i) promoting and protecting biodiversity and green infrastructure”.

- Policy 5.7 Renewable Energy: “Within the framework of the energy hierarchy (see Policy 5.2), major development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.”;
- Policy 5.9 Overheating and Cooling:

B. “Major development proposals should reduce potential overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy: 1) minimise internal heat generation through energy efficient design 2) reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls 3) manage the heat within the building through exposed internal thermal mass and high ceilings 4) passive ventilation 5) mechanical ventilation 6) active cooling systems (ensuring they are the lowest carbon options.

C. Major development proposals should demonstrate how the design, materials, construction and operation of the development would minimise overheating and also meet its cooling needs. New development in London should also be designed to avoid the need for energy intensive air conditioning systems as much as possible. Further details and guidance regarding overheating and cooling are outlined in the London Climate Change Adaptation Strategy.”;

- 5.10 Urban Greening: “Development proposals should integrate green infrastructure from the beginning of the design process to contribute to urban greening, including the public realm. Elements that can contribute to this include tree planting, green roofs and walls, and soft landscaping. Major development proposals within the Central Activities Zone should demonstrate how green infrastructure has been incorporated.”;
- 5.11 Green Roofs and Development Site Environs: “Major development proposals should be designed to include roof, wall and site planting, especially green roofs and walls where feasible, to deliver as many of the following objectives as possible: a) adaption to climate change (i.e. aiding cooling) b) sustainable urban drainage c) mitigation of climate change (i.e. aiding energy efficiency) d) enhancement of biodiversity e) accessible roof space f) improvements to appearance and resilience of the building g) growing food”.

<sup>6</sup> Mayor of London (2016): The London Plan Consolidated with Alterations since 2011



<b>The Draft London Plan (2017)</b>	
18.3.12	A draft replacement London Plan <sup>7</sup> was published in December 2017 and although it is currently being consulted upon. Relevant draft policies include:
18.3.13	Policy GG6 Increasing efficiency and resilience states:  “To help London become a more efficient and resilient city, those involved in planning and development must: A) seek to improve energy efficiency and support the move towards a low carbon circular economy, contributing towards London becoming a zero carbon city by 2050. B) ensure buildings and infrastructure are designed to adapt to a changing climate, making efficient use of water, reducing impacts from natural hazards like flooding and heatwaves, and avoiding contributing to the urban heat island effect [...]”.
18.3.14	Policy SI2 Minimising Greenhouse Gas Emissions  “A. Major development should be net zero-carbon. This means reducing carbon dioxide emissions from construction and operation, and minimising both annual and peak energy demand in accordance with the following energy hierarchy: 1) Be lean: use less energy and manage demand during construction and operation 2) Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly. Development in Heat Network Priority Areas should follow the heating hierarchy in Policy SI3 Energy infrastructure 3) Be green: generate store and use renewable energy on-site.  B. Major development should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy and will be expected to monitor and report on energy performance.  C. In meeting the zero-carbon target a minimum on-site reduction of at least 35 per cent beyond Building Regulations 117 is expected. Residential development should aim to achieve 10 per cent, and non-residential development should aim to achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided: 1) through a cash in lieu contribution to the relevant borough’s carbon offset fund and/or 2) off-site provided that an alternative proposal is identified, and delivery is certain.  D. Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver greenhouse gas reductions. The operation of offset funds should be monitored and reported on annually”.
18.3.15	Policy SI4 Managing Heat Risk  “A. Development proposals should minimise internal heat gain and the impacts of the urban heat island through design, layout, orientation and materials.  B. Major development proposals should demonstrate through an energy strategy how they will reduce the potential for overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy: 1) minimise internal heat generation through energy efficient design 2) reduce the amount of heat entering a building through orientation, shading, albedo, fenestration, insulation and the provision of green roofs and walls 3) manage the heat within the building through exposed internal thermal mass and high ceilings 4) provide passive ventilation 5) provide mechanical ventilation 6) provide active cooling systems”.

<b>Mayor’s Transport Strategy (2018)</b>	
18.3.16	The Mayor’s Transport Strategy <sup>8</sup> was adopted in March 2018 and details proposed changes in London’s transport network over the coming years. The Strategy emphasises the need to change London’s transport mix, increasing the uptake of active travel and public transport use away from using cars. This shift will improve public health through increased physical activity and reduced air pollution and limit the London’s contribution to climate change. It recommends a London-wide strategic cycle network.
18.3.17	The Strategy refers directly to climate change with Policy 9, stating:  “The Mayor, through TfL and the boroughs, and working with stakeholders, will seek to ensure that London’s transport is resilient to the impacts of severe weather and climate change, so that services can respond effectively to extreme weather

<sup>7</sup> Mayor of London (2017): Draft London Plan

<sup>8</sup> Greater London Authority (2018) Mayor’s Transport Strategy, London.

<sup>9</sup> London Borough of Tower Hamlets (2010) Core Strategy

events while continuing to operate safely, reliably and with a good level of passenger comfort.”	
18.3.18	Policy 23 states:  “The Mayor, through TfL, will explore, influence and manage new transport services in London so that they support the Healthy Streets Approach, guided by the following principles: [...] d) Cleaning London’s air and reducing carbon emissions: new services should achieve the very best emissions standards to reduce emissions of carbon dioxide, nitrogen oxides and particulate matter in London, and enable faster switching to cleaner technologies.”
<b>Local Planning Policy</b>	
London Borough of Tower Hamlets Core Strategy	
18.3.19	The London Borough of Tower Hamlets Core Strategy <sup>9</sup> contains the following relevant objective policies:  Policy SO3 states: <ul style="list-style-type: none"><li>• “Mitigating and adapting the built environment to climate change by limiting carbon emissions from development, delivering decentralised and renewable or low carbon energy and minimising vulnerability to a changeable climate.”</li><li>• “Minimising the use of natural resources.”</li><li>• “Improving air, land and water quality by minimising air, noise, land and water pollution.”</li></ul> SP02 states: <ul style="list-style-type: none"><li>• “Requiring new homes to respond to climate change, including achieving a stepped-target for carbon emissions standards inline with government guidance”.</li></ul> SP11 states: <ul style="list-style-type: none"><li>• “6) Maximising the energy efficiency of existing housing stock by: a) Working with housing providers to ensure regeneration of existing housing stock and redevelopment promotes carbon emissions reductions and is adapted for climate change.</li><li>• 7) Require all new developments to provide 20% reduction of carbon dioxide emissions through on-site renewable energy generation where feasible.</li><li>• 8) Ensure the built environment adapts to the effects of climate change”.</li></ul>
18.3.20	The London Borough of Tower Hamlets Carbon Management Plan sets out the Council’s action pathways to reducing borough wide emissions. The Environment Strategy outlines 5 action areas that seek to tackle climate change <sup>10</sup> ; <ul style="list-style-type: none"><li>• Transport – decreasing business travel and increasing use of sustainable modes of transport.</li><li>• Energy Management – optimise energy use in major buildings and monitor the Council’s carbon footprint including the setting of meaningful targets.</li><li>• Water Management – reduce water consumption in buildings through the use of water saving devices.</li><li>• Waste Management – Establishing a waste baseline and targets to minimise waste.</li><li>• Procurement – Increase procurement of ‘green’ ad sustainable products and services.</li></ul>
18.3.21	The Local Development Framework developed by London Borough of Tower Hamlets has been produced in line with the Community Plan.

<b>London Borough of Hackney Core Strategy</b>	
18.3.22	The London Borough of Hackney Core Strategy <sup>11</sup> contains the following objective policies:  Core Strategy Policy 29 Resource Efficiency and Reducing Carbon Dioxide Emissions: <ul style="list-style-type: none"><li>• “Hackney will address climate change at a local level through the inclusion of mitigation and adaptation measures to reduce CO2 emissions from buildings. This will be achieved by:</li><li>• Ensuring that building design is to a high standard, adhering to the principles of sustainable design and construction.</li><li>• The inclusion of measures to reduce resource consumption in all residential development, in line with the Mayor of London’s Energy Hierarchy.”</li></ul>

<sup>10</sup> London Borough of Tower Hamlets (2016) Carbon Management Programme, Carbon Management Plan, 2016-2020

<sup>11</sup> London Borough of Hackney (2010) Core Strategy

	Core Strategy Policy 30 Low Carbon Energy, Renewable Technologies and District Heating: <ul style="list-style-type: none"><li>“As part of the shift to a low-carbon Hackney and to tackle climate change, opportunities to generate energy from non-fossil fuel and/or low carbon sources will be encouraged throughout the borough.”</li></ul>
	Core Strategy Policy 32 Waste: <ul style="list-style-type: none"><li>“Minimising waste during design and construction of development; including production of site waste plans to arrange for efficient materials and waste handling.</li><li>The incorporation of integrated and well designed recycling, composting and residual waste storage facilities in all new developments, and reuse storage where appropriate</li><li>Seeking to maximise self-sufficiency in waste management capacity in line with the London Plan”.</li></ul>
	Core Strategy Policy 33 Promoting Sustainable Transport <ul style="list-style-type: none"><li>“Hackney is committed to prioritising sustainable transport, walking and cycling over private car use, and providing safe and convenient access to rail and bus travel. The need to travel will be reduced through the efficient spatial arrangement of activities and land use throughout the borough.”</li></ul>
	London Borough of Hackney Climate Change Strategy
18.3.23	The London Borough of Hackneys Climate Change Strategy <sup>12</sup> contains the following objective priorities that the Council is aiming to achieve:  Priority 4 Ensuring Sustainable Design and Construction: <ul style="list-style-type: none"><li>“All new buildings built to a high level of energy efficiency that minimise the need for heating and cooling, using construction methods that minimise the use of natural resources.</li><li>All new homes built in Hackney after 2016 to be carbon neutral and for commercial buildings to be built to the highest level of sustainable design and construction by 2016.”</li></ul> Priority 5 Promoting and Delivering Renewable Energy and District Heating Schemes: <ul style="list-style-type: none"><li>“Solar hot water and PV (photovoltaic) arrays designed into new developments and where feasible in existing developments.</li><li>Require energy supply from CHP and renewable energy in new developments</li><li>Increase uptake of small-scale renewable technologies in new and existing developments by awareness raising and promoting behavioural change”</li></ul>
	Other Relevant Policy, Standards and Guidance
	The Fifth Carbon Budget
18.3.24	The 2008 Climate Change Act <sup>13</sup> requires the UK to significantly reduce emissions from greenhouse gases by 2050 and that climate change risks are prepared for. In order to do this the Act requires the government to set legally-binding ‘carbon budgets’ to ensure the 2050 targets are reached. The first 5 carbon budgets have been put into legislation and run until 2032. The Committee on Climate Change advises on the appropriate level of each carbon budget. The budgets are designed to reflect a cost-effective way of achieving the UK’s long-term climate change objectives. The budgets run over different time scales with the 4 <sup>th</sup> Carbon budget runs from 2023-2027, with the fifth carbon budget running from 2028-2032. The fifth carbon budget has been adopted for this Chapter as it represents when the scheme will become operational.
18.3.25	The fifth carbon budget document <sup>14</sup> , produced by the Committee on Climate Change (CCC), reports on UK carbon budgets by sector, and reductions that need to be achieved for the UK to meet its target of 80% by 2050. It includes historical and projected GHG emissions and reports how the UK’s power network is expected to be decarbonised.
	UK Greenhouse Gas Statistics
18.3.26	The Department for Business, Energy and Industrial Strategy (BEIS) (formerly the Department of Energy and Climate

<sup>12</sup> London Borough of Hackney (2009) Climate Change Strategy

<sup>13</sup> Climate Change Act (2008) (<http://www.legislation.gov.uk/ukpga/2008/27/contents>)

<sup>14</sup> Committee on Climate Change (2015) The Fifth Carbon Budget, UK, Committee on Climate Change.

<sup>15</sup> Department for Business, Energy & Industrial Strategy (2017): UK local authority and regional carbon dioxide emissions national statistics: 2005-2015 (<https://www.gov.uk/government/collections/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics>)

<sup>16</sup> Department for Business, Energy & Industrial Strategy (2017): Greenhouse gas reporting: conversion factors 2017

	Change) reports on energy and emissions projections by source, and reports on GHG emissions from a geographical perspective <sup>15</sup> .This allows a review of trends over the period 2005-2015 for a particular Local Authority to be undertaken.
18.3.27	They have also published conversion factors for GHG reporting <sup>16</sup> .  <b>WebTAG Data Book</b>
18.3.28	The Department for Transport produces transport analysis guidance (TAG) <sup>17</sup> on how the UK’s modal mix (diesel, petrol, electric) will change over time, as well as carbon dioxide emissions for different transportation modes (and projections for future efficiency).  <b>Inventory of Carbon and Energy (ICE) Database</b>
18.3.29	Researchers from the University of Bath’s Sustainable Energy Research Team have produced a database <sup>18</sup> that quantifies the embodied energy and carbon for materials often used in buildings’ construction. This was used to establish ‘emissions factors’ associated with various building materials in this assessment (please see <b>ES Addendum Volume 4, Appendix E: Climate Change</b> ).
	<b>Greater London Authority (GLA) Energy Assessment Guidance</b>
18.3.30	The GLA guidance has been prepared to explain how an energy statement to accompany strategic planning applications <sup>19</sup> set out in the London Plan. The purpose is to demonstrate the proposed climate change mitigation measures comply with the London Plan energy policies including the energy hierarchy.

	<b>Technical Standards and Guidance</b>
	<b>IEMA Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance</b>
18.3.31	The approach to assessing the potential impact of the Proposed Amendments on climate change will follow the Institute of Environmental Management and Assessment (IEMA) guidance ‘Assessing Greenhouse Gas Emissions and Evaluating Their Significance’ (2017) <sup>20</sup> . This guidance describes how a proportionate assessment of a development’s potential impact on climate can be achieved and how to communicate the results in terms of a notional percentage contribution relative to a carbon budget, accounting for achievable mitigation.
	<b>IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaption</b>
18.3.32	The Institute of Environmental Management & Assessment (IEMA) has developed a framework for considering climate change resilience and adaption within the EIA process in line with the EIA regulations <sup>21</sup> . The guide is designed to ensure that both climate change resilience and adaption is incorporated in any future developments in the UK.

## 18.4 CONSULTATION

18.4.1	A review of the Scoping Opinion was requested by the Applicant in March 2019 subject to the Revised Scheme. <b>Table 18.1</b> outlines the comments received in the 2019 Scoping Opinion Review and where they have been addressed within the documentation.
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<sup>17</sup> Department for Transport (2017): WebTAG Transport Analysis Guidance data book, December 2017

<sup>18</sup> University of Bath (2011): Inventory of Carbon and Energy (ICE) Database (Version 2.0)

<sup>19</sup> Greater London Authority (2018) Energy Assessment Guidance.

<sup>20</sup> IEMA (2017) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance

<sup>21</sup> IEMA (2015) Environmental Impact Assessment Guide to Climate Change Resilience and Adaption

Table 18.1 Scoping Opinion Comments and Response

Topic / Section	Summary of Comment	Location within the ES Addendum where comments are addressed
Paragraphs 4.21-4.23 of 2014 Scoping Opinion, updated in 2019 Scoping Opinion Review.	Coverage of the project's increase or decrease in greenhouse gas emissions, as well as climate change resilience and adaptation...clear reference to suitable guidance [and]... other topics in the ES Addendum where issues will be covered.	Climate Change Mitigation and Adaptation  Water Resources and Flood Risk

CLIMATE CHANGE MITIGATION

18.5 ASSESSMENT METHODOLOGY

18.5.1	The methodology applied to the climate change mitigation assessment follows the IEMA guidance <sup>20</sup> . The significance criteria used for this assessment was determined using expert judgement.
18.5.2	<div>The goal and scope of undertaking this assessment is to:</div> <div><ul style="list-style-type: none"><li>identify the existing sources of GHG currently at the site, and consider how these may change under a ‘do-minimum’ scenario;</li><li>identify the likely sources of GHG emissions arising from the construction, operation and decommissioning of the Revised Scheme, and quantify them as far as practical; and</li><li>consider measures in which different alternatives (such as development type, construction methodology, operating mechanisms, and end of life uses) can demonstrably reduce GHGs.</li></ul></div> <div>Study Boundaries</div>
18.5.3	A ‘future baseline’ (i.e. ‘do minimum’ scenario) was considered for a reasonable time in the future, a nominal 20-year period (2039), to take into account how the emissions profile might change in the future.
18.5.4	<div>The baseline conditions will be used to quantitatively assess the GHG emissions against for the following ‘modules’ of the project’s lifecycle:</div> <div><ul style="list-style-type: none"><li>construction; and</li><li>operation.</li></ul></div>
18.5.5	The Revised Scheme will be designed to have a lifespan of approximately 40-60 years which is a typical lifespan for a reinforced concrete slab (ISO 15686-1 <sup>22</sup> ). The GHG emissions associated with the ‘end of life stage’ will be described qualitatively, along with possible measures to mitigate these. A quantitative assessment is not considered practical at this stage, due to the uncertainty over the project’s outline nature and lifecycle, and the future situation with respect to demolition waste management, future land use requirements, etc.
18.5.6	<div>Cut off rules (exclusions) apply to those activities that do not significantly change the result of the quantification, and this would account for anything less than 5% of the energy usage. This was taken to include:</div> <div><ul style="list-style-type: none"><li>temporary construction site accommodation;</li><li>refuse collection from public bins; and</li><li>street lighting, traffic signals and security cameras.</li></ul></div>

<sup>22</sup> BSI (2001): ISO 15686-1:2011 Buildings and constructed assets — Service life planning Part 1: General principles and framework

Information and Assumptions

18.5.7	<div>The calculation data used in this assessment was obtained from a variety of sources:</div> <div><ul style="list-style-type: none"><li>existing baseline land uses, building floor areas, numbers/type of street lighting: these were obtained through a review of the site aerial photography;</li><li>two-way construction traffic was based on assumptions of HGV and LGV movements provided in the Transport Assessment, along with an estimation of the average two-way distance for each vehicle type and emissions factors from BEIS<sup>16</sup>;</li><li>indicative construction plant equipment was based upon professional judgment and experience of similar schemes. A detailed quantification of construction plant emissions was not undertaken, as it will be dependent on the appointed contractor;</li><li>construction building materials were categorised into broad types, and their quantities based upon information provided by the Projects’ Quantity Surveyor. Certain Assumptions needed to be made to convert some of this information received in to the appropriate units required to calculate the embodied carbon;</li><li>regulated operational energy use was quantified, but through the projects Energy Strategy. Unregulated operational energy was considered through professional judgement; and</li><li>operational transport related emissions were based upon details provided in the Transport Assessment.</li></ul></div>
18.5.8	GHG emission factors (i.e. a value given for GHG emissions per unit of activity) were also obtained from the Inventory of Carbon and Energy (V2.0) <sup>18</sup> .
	Significance Criteria
18.5.9	As stated in the IEMA Guidance <sup>20</sup> , “GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant”. It goes on to explain that there is no single preferred method to evaluate significance, but the greater the project’s carbon budget (i.e. magnitude of change), the greater its significance. Unlike other EIA topics, sensitivity is only considered for a single receptor (i.e. the whole planet), and therefore it is the magnitude that drives significance. It is therefore practical to base the assessment on professional judgement, and in a qualitative and comparative manner.
18.5.10	<div>Therefore, the following are descriptions of different levels of effect assessed (all compared to the baseline GHG emissions):</div> <div><ul style="list-style-type: none"><li>major beneficial – A substantial reduction of GHG emissions;</li><li>moderate beneficial – A notable reduction of GHG emissions;</li><li>minor beneficial – A slight reduction of GHG emissions;</li><li>negligible – An imperceptible change in GHG emissions;</li><li>minor adverse – A slight increase of GHG emissions;</li><li>moderate adverse – A notable increase in GHG emissions; and</li><li>major adverse – A substantial increase in GHG emissions.</li></ul></div>

18.6 DETERMINATION OF BASELINE

Local Context

18.6.1	In order to understand context and trends in GHG emissions at the local level. <b>Table 18.2</b> and <b>Table 18.3</b> provides a breakdown of total GHG emissions from three main sources over the period 2005-2016 for London Borough of Tower Hamlets and London Borough of Hackney respectively.
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Table 18.2 Carbon dioxide emissions within London Borough of Tower Hamlets

Year	Industry and Commercial Total	Domestic Total	Transport Total	Grand Total	Population ('000s, mid-year estimate)	Per Capita Emissions (t)
2005	1,333.2	368.1	331.5	2,033.0	213.4	9.5
2006	1,670.3	371.9	333.9	2,376.2	218.4	10.9
2007	1,654.5	370.9	333.8	2,359.3	225.3	10.5
2008	1,712.1	379.4	316.9	2,408.5	231.9	10.4
2009	1,467.6	350.6	307.8	2,126.1	240.5	8.8
2010	1,583.9	375.3	309.0	2,268.1	248.5	9.1
2011	1,316.7	336.9	293.4	1,946.9	256.0	7.6
2012	1,465.8	364.5	281.0	2,111.2	263.6	8.0
2013	1,347.9	349.3	277.7	1,974.8	273.6	7.2
2014	1,153.4	291.6	275.8	1,720.6	284.6	6.0
2015	952.5	277.4	260.8	1,490.5	293.8	5.1
2016	807.5	256.5	262.1	1,325.9	300.9	4.4

Source: UK local authority and regional carbon dioxide emissions national statistics: 2005-2016<sup>15</sup>

Table 18.3 Carbon dioxide emissions within the London Borough of Hackney

Year	Industry and Commercial Total	Domestic Total	Transport Total	Grand Total	Population ('000s, mid-year estimate)	Per Capita Emissions (t)
2005	302.0	427.4	189.6	919.2	216.5	4.2
2006	316.9	422.2	192.5	931.8	220.2	4.2
2007	304.9	414.4	188.8	908.2	224.5	4.0
2008	306.8	419.7	181.7	908.2	231.0	3.9
2009	273.5	382.8	175.6	831.9	236.6	3.5
2010	298.3	412.0	175.9	886.2	241.7	3.7
2011	289.4	364.3	165.5	819.2	247.2	3.3

Year	Industry and Commercial Total	Domestic Total	Transport Total	Grand Total	Population ('000s, mid-year estimate)	Per Capita Emissions (t)
2012	359.3	389.0	161.8	910.0	252.2	3.6
2013	348.5	381.0	155.5	884.9	257.4	3.4
2014	343.7	318.9	153.1	815.7	263.1	3.1
2015	273.9	305.9	149.9	729.7	268.6	2.7
2016	229.6	288.6	149.8	667.9	273.2	2.4

Source: UK local authority and regional carbon dioxide emissions national statistics: 2005-2016<sup>15</sup>

18.6.2 From this it can be seen that, when considering emissions reductions alongside population growth, per capita emissions have reduced by approximately 44.4% over this period, and it is expected that this trend will continue.

Site Emissions

18.6.3 The baseline conditions at the site prior to the construction of the scheme are described in detail in **ES Addendum Volume 2, Chapter 3: Site Description**. In summary, the site is undeveloped and as a result of this, it can be concluded that the GHG emissions associated with the site as it currently exists are negligible.

Future Baseline

18.6.4 Considering known trends and policy support for reducing GHG emissions, it is considered that in the case of a 'do-minimum' scenario at an already developed site, there would be reductions in emissions over the next 20 years or so resulting from aspects such as electric vehicles replacing petrol/diesel, smart technology helping to reduce demand, and decarbonising the National Grid.

18.6.5 However, as this site has no existing development, lighting or roads, there is no scope for emissions to be reduced under a do-minimum scenario.

18.7 IMPACT ASSESSMENT AND MITIGATION

Construction Phase Emissions and Mitigation

18.7.1 GHG emissions can arise through embodied carbon within the fabric of building materials, the transportation of materials and staff to and from the site, and the running of the construction plant and facilities. Carbon dioxide equivalent (CO2e) is a term describing greenhouse gases in a common unit. For any quantity and type of greenhouse gas CO2e signifies the amount of CO2 which would have the equivalent global warming impact.

18.7.2 Impacts from these and a range of suggested mitigation are set out below.

Construction Materials

Impacts

18.7.3 The embodied carbon associated with the building materials for the Revised Scheme was quantified using estimated quantities of specific materials (e.g. reinforced concrete), and applying an emissions factor established through research and reported in the Inventory of Carbon and Energy (the 'ICE database').

18.7.4 A worksheet showing the background calculations and assumptions is provided in **ES Addendum Volume 4, Appendix E: Climate Change**. However, the total embodied carbon in the building's materials is approximately 42,297 tonnes (TCO2e).

18.7.5 Given that the total design life for the Revised Scheme is expected to be between 40 and 60 years, the effect is considered to be moderate-minor adverse in the context of the local carbon reduction targets and negligible at a higher



	spatial level.
	<i>Mitigation</i>
18.7.6	Given the stage of the applications designs, there are reasonable opportunities to review the materials prior to construction to identify opportunities for replacing a material with one with a lower embedded carbon (for instance sourcing only recycled metals and using cement with a higher fly ash content), or less material overall (such as thinner slabs, frames and piles).
18.7.7	<p>However, care must be taken to:</p> <ul style="list-style-type: none"> <li>consider the need to adapt to climate change (see later in this chapter);</li> <li>balance this with the opportunities to minimise carbon emissions associated with the operation; and</li> <li>consider the circular economy, with respect to safeguarding opportunities for the reuse or better recycling of a building material or component.</li> </ul>
18.7.8	Although it is not clear how effective this mitigation would be at this stage, there will be opportunities to reduce the embodied carbon, and these could be considered at an appropriate design stage.
18.7.9	Furthermore, as part of the asset management procedures, when certain building components reach the end of their useful life, consideration should be given to the embodied carbon of the replacement components.
	<b>Construction Traffic</b>
	<i>Impacts</i>
18.7.10	The total carbon emissions associated with transporting the materials to and from the site was calculated by using the Defra Emissions Factor Toolkit <sup>23</sup> , to the total number of vehicle movements, with assumptions being made with respect to size, the distance from the depot to the construction site and assuming a standard fuel type. The calculations are provided in <b>ES Addendum Volume 4, Appendix E: Climate Change</b> .
18.7.11	The quantity emitted will correlate with the construction traffic profile, with more being produced during peaks in construction activity. Approximately 5,971 TCO2e a year would be produced, which in the context of the other construction projects in London is small and therefore considered minor adverse, and significant against the local targets.
	<i>Mitigation</i>
18.7.12	Careful management of construction traffic emissions could reduce the effects, sourcing products from local businesses and appropriate measures will be set out in a Construction Traffic Management Plan.
	<b>Construction Plant</b>
	<i>Impacts</i>
18.7.13	Site enabling, demolition, excavation and construction activities require a substantial amount of fuel/energy to run the machinery and plant. The activities are expected to include excavation and piling, substructure and superstructure construction, internal fit out and external landscaping. The plant used presented in <b>ES Addendum, Volume 2, Chapter 5: Revised Scheme and Construction Overview</b> include piling rigs, excavators, diggers, concrete pumps, generators, etc. In addition to that list, there is also other direct energy usage through site offices and welfare facilities, lighting, security equipment, etc, all of which use energy.
18.7.14	Over the course of the programme, a small amount of carbon would be generated, which could be minor adverse and significant in a local context.
	<b>Mitigation</b>
18.7.15	At this stage of the planning process, there is little detailed information with regards to specific plant and site office requirements. Therefore, it is not something that can be meaningfully estimated.

<sup>23</sup> Defra Emissions Factor Toolkit <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>

	<b>Operational Phase Emissions and Mitigation</b>
18.7.16	<p>During the operational life of the Revised Scheme there is a large potential for GHG emissions to arise from:</p> <ul style="list-style-type: none"> <li>Energy use associated with uses regulated under Part L of the Building Regulations 2013 (as amended) (i.e. lighting, hot water, pumps/fans, space heating, cooling);</li> <li>Energy use associated with direct unregulated usage that is not covered by the Building Regulations (i.e. cooking, appliances and communal lighting);</li> <li>Indirect emissions through the use of different transport modes; and</li> <li>Indirect emissions through the provision of servicing, and waste disposal.</li> </ul>
	<b>Regulated Uses</b>
	<i>Impacts</i>
18.7.17	The scheme must meet carbon emission limits specified in Part L of the Building Regulations 2013. This has been calculated for the scheme through the Energy Strategy (Hoare Lee, 2019) submitted in support of their planning application. Without the below mitigation, it is expected to result in ~2,640 TCO2e per year, which would be compliant with Part L 2013 of the Buildings Regulations.
18.7.18	In the context of the Government's target to reduce CO2 emissions by at least 80% of 1990 levels by 2050, this represents a minor adverse effect, although significant.
	<i>Mitigation</i>
18.7.19	The Energy Strategy for Bishopsgate Goodsyrd follows the energy hierarchy set out in the London Plan, with the aim of promoting an energy efficient and low carbon approach which minimises carbon usage now and in the future. The energy hierarchy aims to: 1 Be lean; use less energy, 2 Be Clean: supply energy efficiently, 3 Be green: use renewable energy.
18.7.20	The site-wide 'Gas Boiler Baseline' was given at ~2,640 TCO2e per year. The 'Be Lean' approach will be utilised by ensuring highly efficient building fabrics and building services are used throughout to reduce carbon emissions and energy demand. This approach has the potential to reduce carbon emissions by 5% against the Part L baseline for domestic, with 2% site-wide. The 'Be Clean' approach was not incorporated. The 'Be Green' approach demonstrated the greatest potential for regulated carbon emission reduction against the Part L baseline. High efficiency air source heat pumps will be used for each plot combined with sitewide energy sharing (energy demand reduction) and solar PV will lead to a potential 36% site-wide reduction totalling more than 935 TCO2e.
18.7.21	The new London Plan commits developments to zero carbon for residential buildings from 2016 and zero carbon non-domestic buildings from 2019 (which doesn't apply to the Proposed Development) which can also be met via offset payments if necessary. Energy monitoring could also be employed to allow future occupants to understand the way in which they are consuming their energy and how much it costs and how they could reduce it.
	<b>Unregulated Uses</b>
	<i>Impacts</i>
18.7.22	Unregulated energy includes small power electricity use (computers, plug in devices) and catering energy consumption. Currently, unregulated energy is not included within the Part L assessments but can form a significant part of overall energy consumption and CO2 emissions from developments.
	<i>Mitigation</i>
18.7.23	No details on how reduction of these emissions would be achieved are available at this stage. However, they could include using white goods with good energy ratings.
	<b>Operational Traffic</b>
	<i>Impacts</i>
18.7.24	The breakdown of trips generated by the Revised Scheme, including the different modes is provided in the <b>ES Volume 2</b> ,

**Chapter 9: Traffic and Transport** and the **Transport Assessment. ES Addendum Volume 4, Appendix E: Climate Change** provides a breakdown of this, assuming a given average distance for HGVs and LGVs, and relying on information from Defra on emissions for different vehicle types.

18.7.25 In total, the yearly operational emissions arising from transport are considered to be approximately 581,626 TCO2e for the 60 year duration of the scheme. This is considered to be minor adverse (and significant), although reductions could still be achieved as described below.

*Mitigation*

18.7.26 As stated in the **Transport Assessment**, a “Travel Plan will be produced which will introduce ways in which to maximise public transport use. As well as the physical measures to be implemented within the Revised Scheme, a series of further “soft” measures will be implemented as part of this strategy.

18.7.27 The pedestrian and cycle access strategy will be supported by several promotional and awareness campaigns, provided as part of the travel demand management strategy”.

18.7.28 Although the Travel Plan is provided in **Transport Assessment**, the effectiveness of these measures cannot be accurately quantified at this time, but are expected to result in a degree of carbon savings, and an improvement on the effect in the context of the local targets.

**Other Emissions**

*Impacts*

18.7.29 Other operational phase emissions are expected to arise from servicing vehicles (considered as part of the operational traffic), the disposal, recycling and re-use of waste, the indirect emissions associated with street lighting and other infrastructure (including water and waste water).

*Mitigation*

18.7.30 With respect to operational waste management, the Revised Scheme will be designed to allow for appropriate levels of waste storage to separate waste streams from the various proposed uses, enable recycling and less frequent collections (when circumstances allow). This would facilitate improved waste management to move towards policy targets and reduce associated GHG emissions to overall negligible levels (not significant). Smart infrastructure could help with reducing any adverse emissions resulting from operational emissions, however this falls under others’ responsibility.

**End of Life Phase Emissions and Mitigation**

**Impacts**

18.7.31 Once the Revised Scheme reaches the end of its design life, it is anticipated that it will be replaced by new buildings or uses.

18.7.32 This replacement is likely to result in some substantial GHG emissions, due to both the demolition and construction activities (included embodied carbon within the new building materials) and future operational activities.

18.7.33 As this is such a long time in the future and subject to many uncertainties, a quantification of this has not been undertaken, however it is considered that the effect could be moderate-minor adverse, and significant (especially considering the criticality of further mitigating climate change by that stage).

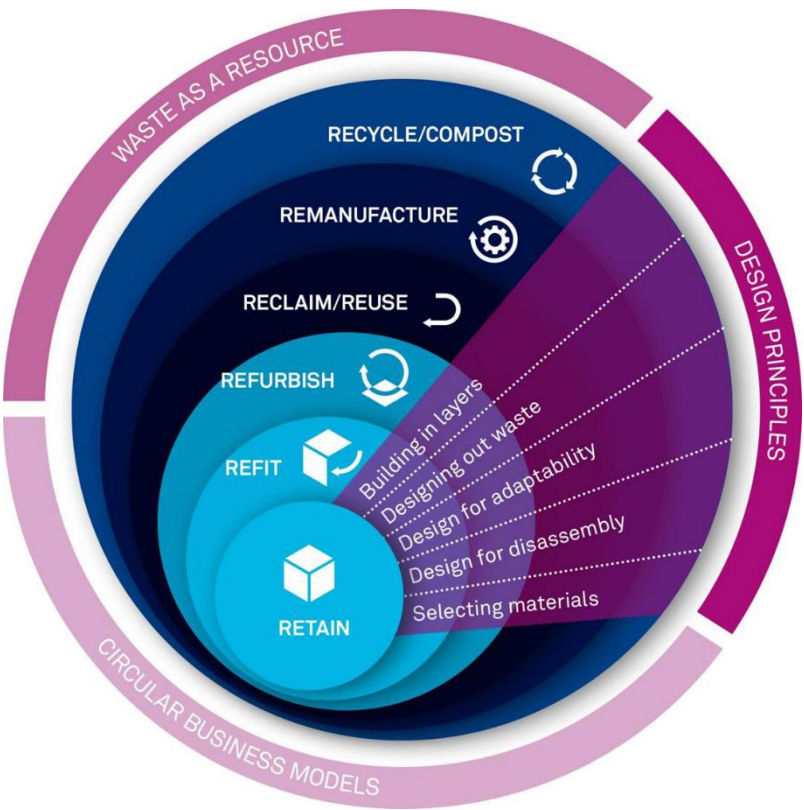
**Mitigation**

18.7.34 No mitigation measures can be confirmed at this stage. Based upon current best practice, the mitigation principles set out above (relating to the construction and operation phases) will be followed to reduce emissions. However, at this point in the future there are likely to be very different circumstances, such as the availability of new low carbon building materials and better energy efficiency.

18.7.35 However, the key element that can and should be considered at this stage to reduce emissions is the incorporation of ‘circular economy’ principles.

18.7.36 **Figure 18.2** shows how the concept of a circular economy works, with consideration needing to be given to how design principles (e.g. selection of materials, designing for adaptability, etc) can be used, and how waste should be seen as a resource with a preference to retain and refit buildings being preferred over recycling building materials.

Figure 18.2 Circular Economy Principles



Source: <https://academy.rics.org/info/images/Circular.png>

**Cumulative Climate Change Impacts and Mitigation**

18.7.37 The cumulative schemes identified will all lead to GHG emissions in similar ways to those described earlier in this chapter (e.g. from embodied carbon, construction plant and traffic, operation, and eventual decommissioning/deconstruction).

18.7.38 It is not possible or practical to accurately quantify the emissions for each scheme, but based on a broad assumption that by their nature these projects are expected to be major developments of a similar scale to the Revised Scheme, then an estimate could be to multiply the quantified emissions by the number of schemes.

18.7.39 In the context of the significance criteria presented above, this would arguably be considered a notable/substantial increase and therefore moderate to major adverse cumulatively. However, local per capita emissions are expected to reduce as a result of these, as together these projects will lead to a more energy efficient building stock and reduce the reliance on private car use.

# CLIMATE CHANGE ADAPTATION

## 18.8 ASSESSMENT METHODOLOGY

### Approach

- 18.8.1 IEMA's guidance 'Climate Change Resilience and Adaption' (2015)<sup>24</sup> presents a methodology for the consideration of climate change resilience and adaption in the EIA process, which has been followed in this assessment.
- 18.8.2 The main steps are to:
- establish the appropriate climate change projections, for an appropriate timescale (i.e. a future baseline);
  - consider the receptor types assessed in the ES Addendum and identify which are most sensitive to climate change (based upon professional judgement);
  - identify how climate change could affect the predicted environmental topics assessed in Chapters 6-17 in a future year (the 'reported impacts'); and
  - set out measures by which the Revised Scheme can adapt to climate change over its lifetime and to mitigate any worsening of effects caused by climate change.
- Climate Change Projections (Future Baseline)**
- 18.8.3 The first stage of the assessment is to select a future climate scenario to base the assessment on. This is determined by reviewing the future climate projections published by the Met Office (through the UK Climate Projections (UKPC18/UKPC09) website), which includes variables such as annual mean temperatures and annual changes in summer and winter precipitation.
- 18.8.4 The summary information required to give a detailed summary for future climate change predictions using the UKCP18 User Interface, at the time of writing this chapter, is unavailable. The UKCP09 user interface and summary data was therefore used. The overview from the UKCP18 datasets however, reflects that of the UKCP09 climate projections.
- 18.8.5 In the case of the Revised Scheme, it is proposed that the 'medium emissions scenario' (A1B) for the 2080s will be utilised as the future baseline, as this gives a more likely set of projections, given known trends and technological developments. The 2080s covers the years 2070 – 2099 and this is the timeframe considered most relevant to the Revised Scheme, due to its anticipated design life. A range of probability levels are available, although this study will use the 50% probability level (i.e. a central estimate with less uncertainty).
- 18.8.6 Key climate projections for the UK (UKPC09) are that:
- 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.

- 18.8.7 These changes could considerably affect the construction and maintenance of buildings and infrastructure and also on the natural environment and health. For example, drier and hotter summers will lead to more incidences of heat damage to structures and equipment; the hotter and drier summers will also lead to far dustier conditions resulting in a deterioration of air quality creating exacerbated health problems associated with bad air quality; health effects resulting from heat strokes due to increased temperatures could also arise; more frequent heavy rainfall events will result in increased incidences of flooding in low-lying areas; certain plants and animals will react better than others to a changing climate; and increased variability in soil moisture levels will lead to increased incidences of infrastructure subsidence. These impacts will lead to disruption to services and increased operational, maintenance and emergency repair costs.

- 18.8.8 Like the rest of the UK, London's climate is generally temperate. According to Met Office records for Greenwich Park (the closest climate station to the site), between 1981 and 2010<sup>24</sup>:
- there was an average of 557.4 millimetres (mm) of rain per year;
  - October was typically the wettest month with an average of 61.1 mm of rain;
  - July was typically the driest month with an average of 34.6 mm of rain;
  - the average daily maximum temperature was 15.3°C;
  - the average daily minimum temperature was 7.8°C;
  - July was typically the hottest month with an average maximum temperature of 23.4°C; and
  - February was typically the coldest month with an average minimum temperature of 2.7°C.

### Future Climate Projections for London

- 18.8.9 UKCP09 projections are provided for the medium future emissions levels, which describe the difference between the modelled future climate and the 1961-90 observed baseline climate.
- 18.8.10 A summary of UKCP09 data is shown in **Table 18.4**. These projections show that there are likely to be changes to the average weather conditions in the future. However, not all years will fit a clear trend of change, leading to a variable and unpredictable climate. However, the projections will enable the identification of the likely effects of climate change on the Revised Scheme, and inform appropriate recommendations for changes to design, construction and maintenance policies, standards and practices.
- 18.8.11 It is also projected that average sea levels will continue to rise in the future, increasing the risk of coastal flooding and erosion. The frequency of extreme high water levels is also projected to increase. UKCP09 project that sea levels will rise by between 25cm and 86cm by 2100 and this, combined with a predicted increase in storm surges, will lead to a significantly increased risk of flooding.
- 18.8.12 UKCP09 projections do not include changes to wind or snowfall. However, the Met Office Hadley Centre regional climate model projects a decrease in winter mean snowfall of typically 65% to 80% in high altitude areas across the UK and 80% to 95% elsewhere by the 2080s. Met Office projections for wind speed are for a change of less than +3% over the UK by the 2080s.

Table 18.4 IKPC09 Projections for London under Medium Emissions Scenario (50% level)

Parameter and UK baseline (in brackets)	2020s (2010-2039)	2050s (2040-269)	2080s (2070-2099)
Change in mean winter daily temperature (3.3°C)	+1.3°C	+2.2°C	+3.0°C
Change in mean summer daily temperature (14.1°C)	+1.6°C	+2.7°C	+3.9°C
Change in mean daily summer maximum temperature (18.0°C)	+2.1°C	+3.7°C	+5.3°C
Change in mean daily summer minimum temperature (9.6°C)	+1.6°C	+2.9°C	+4.2°C
Change in annual mean daily precipitation (3.02mm/ day)	0%	0%	0%
Change in winter mean daily precipitation (3.42mm/ day)	+6%	+14%	+19%
Change in summer mean daily precipitation (2.56mm/ day)	-7%	-19%	-23%

<sup>24</sup> Met Office (2012): UK Climate Chapter (obtained from <https://www.metoffice.gov.uk/public/weather/climate/gcpvj0v07>)



Outline Climate Change Adaption Plan

- 18.8.13 This section considers how the inherent uncertainty in climate change predictions can be managed, so as to allow for appropriate adaptation in the future to reflect the realities of a changing climate.
- 18.8.14 The IEMA Guidance recommends that a project’s ability to adapt to climate change should:
  - consider the whole life of the project;
  - have a ‘win-win’ outcome that can provide benefits under multiple scenarios, and that can bring economic, social and environmental benefits;
  - favour flexible future options (including building appropriate safety margins), rather than being too prescriptive and specific over options that can’t be modified in the future;
  - delay details of project elements that are subject to the greatest risk and uncertainty from climate change until later in the programme when more should be known; and
  - follow a hierarchy, whereby avoid, control or manage risks is preferred, enhancement (e.g. to improve the functionality over a project’s lifespan), and compensate (e.g. by providing a measure to offset a climate change impact it exacerbates).
- 18.8.15 The procedure that should be followed is as follows:
  - conceptualise the issues through the assessment across the EIA, and identify the greatest potential impacts and receptors most at risk;
  - manage uncertainty by setting goals/objectives, and action trigger levels, developing a monitoring plan for reviewing updated climate predictions, and define roles, responsibilities and funding streams;
  - implement the plan and monitor/analyse results over the life of the Revised Scheme; and
  - review the plan, collate data received, update the pan as necessary, including the need for additional or different mitigation.

18.9 IDENTIFYING RECEPTORS’ SENSITIVITY TO CLIMATE CHANGE AND ASSESSING GENERIC IMPACTS

18.9.1 **Table 18.5** considers the receptors associated with the topics scoped into the ES, and, using professional judgement, identifies any risks to these receptors or sensitivity to climate change. Given the long-term nature of the changes, a more generic receptor description is provided. Other typical EIA topics such as ecology and landscape will also be sensitive to climate change, but have not been assessed in this ES Addendum and therefore excluded from **Table 18.4**.

Table 18.5 How Climate Change Affects the ES Assessments

ES Chapter	Sensitive Receptor	Potential effect of climate change	Relative Sensitivity/Risk
6: Waste and Recycling	Future on and off-site users	Increased odour due to higher temperatures	High
		Inability to collect waste due to extreme weather	High
	Waste Management Infrastructure	Infrastructure affected by extreme weather	Medium
7. Socio Economics	Users of amenity space	Unable to use the amenity space due to hot/cold/wet weather	High
		Space is flooded	

ES Chapter	Sensitive Receptor	Potential effect of climate change	Relative Sensitivity/Risk
	Users of healthcare facilities	Increased use due to overheating/new diseases	Medium
		Casualties caused by extreme weather event, civil unrest	High
8. Ground Conditions	Future site users and proposed buildings	Creation of new source, pathways, receptor (contamination)	Medium
		Change in ground water flows and levels	Medium
	Off-site users and buildings	Soil moisture changes and destabilisation	Medium
9: Transport and access	Pedestrians and cyclists	There will be more walking and cycling, although they will be sensitive to extreme weather	Medium
	Users of public transport	More overheating and less comfort, potentially less reliability	Medium
10: Wind microclimate	On-site and off-site users	Changes in average wind speeds and occurrence of strong winds	High
11: Daylight, Sunlight and Overshadowing	Indoor users	Sunlight intensity becomes stronger and overheating more likely. Increase in air conditioning units which could exacerbate UHI effect	High
	Outdoor amenity space	Potentially more used due to warm weather	High
		Potentially less used	High
		More flooded, possibly vegetated	High
12: Air Quality	New and existing residents	Hotter temperatures may result in windows being left open for longer	Low (as other options are likely to be available)
		Extremes of dry weather may lead to increased dust generation	Medium
13: Noise and Vibration	New and existing residents	Hotter temperatures may result in windows being left open for longer  Electric vehicles would lead to traffic noise decreasing (although wetter conditions could counteract this)  Cooling/ventilation plant may be installed to run for longer	Low (as other options are likely to be available)

ES Chapter	Sensitive Receptor	Potential effect of climate change	Relative Sensitivity/Risk
14: Water resources and Flood risk	New and existing residents	Changes in the flood zone caused by changes upstream or at the site itself	High
		Blockage of groundwater migration, resulting in groundwater flooding	Medium
	Off-site people and property	Increased run off causing downstream flooding	High
	Water Resources and infrastructure	Local sewage and water supplies threatened (including drought/inundation)	High
15: Archaeology	Buried archaeological resources	Changes to ground moisture and stability	Low (unless it is something well known about)
17: Ecology	Introduced biodiversity and habitats	The planting may not be resistant to extremes of temperature and moisture causing it to die or become stunted	Medium

18.9.2 As shown in Table 18.4 there is a potential for climate change to affect some, but not all, topics in this ES Addendum. It is possible that new significant effects could occur that would be otherwise negligible under current climate conditions. However, the following section provides a set of measures that can form an outline Climate Change Adaptation Plan, in order to demonstrate how the effects could be mitigated in the future.

## 18.10 MEASURES FOR ADAPTING TO CLIMATE CHANGE

- 18.10.1 The buildings will be designed to cope with the projected changes in climate. However, a Climate Change Adaptation Plan could be produced (at a future design stage) as a measure to mitigate against the effects of climate change on generic receptors described above. This could include, but not be limited to, the following options:
- The fit-out of the tenanted spaces will be the responsibility of each tenant. Tenants could install highly efficient systems wherever possible, and meet the performance stipulations within the Non-Domestic Building Services Compliance Guide;
  - The units could benefit from energy monitoring devices which would allow building managers to instantaneously view the energy requirements associated with maintaining appropriate internal conditions. It is anticipated that this will be linked to the incoming electricity and heat supply, and provide data upon which occupiers can better manage their specific needs;
  - Heating systems could be provided with zonal, programmable thermostatic controls linked to a master control panel which will allow occupants to control each zone independently for maximum flexibility. Hot water could be separately programmable;
  - Water consumption in the development will be minimised by the specification of highly efficient water installations. This will limit water consumption in apartments to 105 litres per person per day. Further consideration of rainwater/greywater harvesting should be given, including the future adaptability to collect this in greater quantities;
  - The Flood Risk Assessment and Drainage Strategy, as well as the proposed finished floor levels have taken climate change into account and therefore the high risk to these receptors is being managed;
  - External spaces could be planted with a range of species, including native and drought resistant spaces.
  - Passive provision could be allowed for to install additional solar shading over public amenity space, car parks, etc.

## 18.11 CUMULATIVE CLIMATE CHANGE EFFECTS

- 18.11.1 The potential effects from climate change identified in Table 18.4 could affect all of the cumulative schemes, and there is clearly a need for a co-ordinated approach to both mitigating and adapting to climate change. There is strategic guidance and ever-stronger policies in the form of the NPPF and the Local Planning Policy (as described earlier in this chapter).
- 18.11.2 It is considered that with all new major development needing to carefully consider climate change adaptation and be designed accordingly, there will be an overall positive cumulative effect.

## 18.12 RESIDUAL EFFECTS

### Climate Change Mitigation

- 18.12.1 **Table 18.6** provides a summary of the residual effects associated with climate change mitigation (carbon and GHG emissions).

Table 18.6 Significant Residual Effects

Description of Effect	Potential impact including significance	Mitigation	Residual Effect including significance
<b>Construction</b>			
Embedded carbon in building materials (across project lifespan)	Moderate-Minor adverse (significant)	Consider using lower embedded carbon materials	Minor adverse (not significant)
Carbon emissions from construction traffic	Minor adverse (not significant)	Consider using more efficient vehicles and sourcing products locally	Minor adverse (not significant)
Carbon emissions from construction plant	Minor adverse (not significant)	Consider using more efficient plant	Minor adverse (not significant)
<b>Completed Development</b>			
Operational regulated energy use	Minor adverse (not significant)	Consider using lean, clean and green energy principles	Minor adverse (not significant)
Operational unregulated energy use	Negligible (not significant)	Consider using more efficient equipment	Negligible (not significant)
Operational traffic emissions	Minor adverse (not significant)	Encourage greater use of public and active travel modes	Minor adverse (not significant)
<b>End of Life</b>			
End of life carbon costs (wastage)	Moderate-Minor adverse (significant)	Adopt circular economy principles	Minor adverse (not significant)

18.12.2 It should be noted that the IEMA Guidance states<sup>20</sup>: “in the absence of any significance criteria or a defined threshold, it might be considered that all GHG emissions are significant and an EIA should ensure the project addresses their occurrence by taking mitigating action”. In this respect, whilst it is acknowledged that all emissions from the Revised Scheme will contribute to the overall significant effect of climate change, it is considered that the project has and will adopt an appropriate and reasonable level of mitigation and the residual effects should therefore be considered not significant for the purposes of this EIA.

Climate Change Adaptation

18.12.3 With respect to climate change resilience, assuming the appropriate level of adaptation measures (which cannot be confirmed at this stage), the effects described in this ES Addendum are expected to remain valid throughout the lifetime of the Revised Scheme.

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# 18.13 SUMMARY AND CONCLUSIONS

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- 18.13.1 This chapter has considered both how the Revised Scheme can mitigate its effect on climate change by reducing carbon/GHG emissions throughout its life cycle, and how it can be affected by (and adapt to) a changing climate over its life cycle.
- 18.13.2 A range of measures have been incorporated in the Revised Scheme to minimise carbon emissions, appropriate to the scale and opportunities associated with the project.
- 18.13.3 These typically relate to the operational energy strategy and meeting zero carbon targets, but can also include:
  - Using building materials with lower embodied carbon, or less material overall than would be associated with a typical building specification.
  - Sourcing products locally and using more efficient building plant and techniques.
  - Reducing the need for future occupants to travel by private vehicle, and use of smarter, more efficient servicing of proposed uses.
- 18.13.4 Risk from climate change, and opportunities to adapt to these have been identified in accordance with the emerging London Plan Policy GG6. These measures include, improving energy efficient and embracing a circular economy, these will be considered by the Applicant and future tenants, and adopted as their individual circumstances require.



Table 18.7 Summary of Residual Effects

Receptor/Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/Spatial Extent/Duration/Likelihood of Occurrence	Significance of Effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual Effect
Construction								
Global Climate	High	Building materials, construction traffic emissions, construction plant emissions	Energy Hierarchy	High	Moderate-Minor	Consider using lower embedded carbon materials Fuel efficient vehicles Locally sourced products (circular economy) Efficient plant	Negligible	Negligible
				Direct				
				Local and Global				
				Short and Long term				
				Likely				
Operation								
Global Climate	High	Regulated/Unregulated energy use, vehicles associated with the Proposed Development	Energy Hierarchy, No on-site parking	High	Minor-Adverse	To be agreed with local planning authority and secured through condition	Negligible	Negligible
				Direct				
				Local and Global				
				Long-term				
				Likely				

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