Appendix 10.3 Inter-Related Effects of Climate Change

10.1 Introduction

10.1.1 This appendix to Chapter 10: Climate Change of the Environmental Statement (ES) assesses the extent to which climate change could exacerbate or ameliorate the effects of the Proposed Development on sensitive receptors (i.e. the inter-related effects of climate change with other environmental impact pathways).

10.1.2 Inter-related effects are effects that interact spatially and/or temporally, resulting in multiple effects, or effects of a greater significance, upon a single receptor. The inter-related effects of climate change can be considered in two categories:

- climate change altering the sensitivity of receptors or the baseline environment, thereby increasing the significance of effects; and,
- climate change modifying an impact pathway, i.e. by changing the magnitude or spatial extent or introducing new receptors.

10.2 Approach to assessment

Policy and guidance

10.2.1 The following legislation and guidance documents have been considered as part of this assessment:

- The Town and Country Planning (Environmental Impact Assessment) Regulations 2017[1];
- Planning Inspectorate Advice Note Nine: Rochdale Envelope, 2018[2]; and
- IEMA Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation, 2020[3].

The Town and Country Planning (Environmental Impact Assessment) Regulations 2017

10.2.2 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 state that:

[1] EIA Regulations, 2017. [Online] Available at: https://www.legislation.gov.uk/uksi/2017/571/contents, last accessed 09/01/2025.

[2] PINS, 2018. [Online] Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advicenotes/advice-note-nine-rochdale-envelope/, last accessed 05/02/2024. This guidance is for nationally significant infrastructure projects but is a relevant statement of good practice that can be applied to any development type, in a proportionate way.

[3] IEMA, 2020. [Online] Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climatechange-resilience-and-adaptation-2020, last accessed 05/12/2024.

"(2) The EIA must identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of the proposed development on the following factors:

(a) population and human health;

(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

(c) land, soil, air, water and climate;

(d) material assets, cultural heritage and the landscape; and

*(e) **the interaction between the factors**4 referred to in sub-paragraphs (a) to (d)." [emphasis added]*

PINS Advice Note Nine

10.2.3 The PINS Rochdale Envelope Advice Note states that an ES should:

*"…ensure that the assessment of the worst case scenario(s) addresses impacts which may not be significant on their own but **could become significant when they inter-relate with other impacts** alone or cumulatively with impacts from other development (including those identified in other aspect assessments)."* [emphasis added]

IEMA EIA Guide to: Climate Change Resilience & Adaptation

10.2.4 With regard to "in-combination" climate impacts (an alternative term for inter-related effects), the guidance states that an ES:

"…need[s] to consider if the impacts of the development on environmental receptors are likely to be different because of the projected future climate conditions compared with the existing baseline conditions. Consideration should also be given to whether completely new effects will arise as a result of the development during construction and/or operation with the future climate conditions".

and additionally:

"…an assessment should be undertaken to identify whether the additional effects of future climate impacts alter the sensitivity and/or magnitude of the effect so that the significance/level of significance of the effects within other topics identified against baseline conditions changes."

Methodology

10.2.5 The assessment has considered how impacts of the Proposed Development, in combination with the effects of climate change, may affect receptors throughout the construction phase and occupational lifetime.

10.2.6 The assessment included the following steps:

- identification of impacts due to the Proposed Development on the present-day environment, as assessed within the applicable ES chapters;
- consideration of how those impacts may be modified by future climate conditions;

- consideration of how the sensitivity or resilience of receptors may be modified by future climatic conditions; and
- an assessment of the potential change in significance of effect on receptors as a result of the above factors

10.2.7 The assessment does not aim to be determinative of significance levels, which have been assessed in the applicable ES topic chapters; but identifies where there is the potential for inter-related effects to increase or decrease the significance of effects reported alone.

10.2.8 The receptors identified can be broadly categorised as follows:

- landscape and visual: designated sites; visual receptors (residents; users of public rights of way (PRoWs); other visual receptors);
- cultural heritage: buried archaeology; designated heritage assets; settings of heritage assets;
- land use, recreation, socio-economics: agricultural land; users of PRoWs and common land; employment levels, housing and other local services;
- ecology: ecologically designated sites; important habitat features; protected species;
- hydrology: surface water bodies; flood risk (residents; other land uses);
- traffic and transport: road users, residents; pedestrians/cyclists; sensitive local uses (e.g. schools, hospitals, local facilities);
- noise and vibration: residents, users of PRoWs; users of other land uses (e.g. places of work);
- air quality: residents; places of public amenity/public attractions; sensitive local uses; species/habitats; and
- health: residents in the local area and future residents of the Proposed Development.

10.3 Future climate baseline

10.3.1 A full future climate baseline is reported in Appendix 10.2: Climate Risk Assessment. To summarise the future climate baseline, it is projected that there will be an increased variability in precipitation trends: precipitation is predicted to decrease during the driest season and increase in the wettest season; but the driest and wettest months may be less so. Temperatures are anticipated to increase annually relative to the 1981-2010 baseline, both during the coldest and hottest seasons and months. Finally, humidity is also expected to increase during both the summer and winter, and hence the annual average will increase.

10.4 Assessment findings

10.4.1 Table 10.1 presents the potential inter-related effects of climate change.

Table 10.1 Inter-related effects of climate change

Climate change effect	Receptor group	Potential for climate change to modify the effect on receptor	Effect on receptor	Mitigation measures	Further information
Drought and increased summer temperatures ('heatwave')	Landscape and visual	The planned landscape planting could fail as a result of increased temperatures and drought conditions in summer months.	Greater adverse impact on visual receptors if planting were to fail.	Consideration of climate resilience (e.g. drought tolerance) in the design and species mix of the landscape planting proposed; a Landscape and Ecological Management Plan with secured aftercare period.	ES Chapter 14: Landscape and Visual
	Air quality	Changes in air pollutant dispersion can affect short-term and potentially also annual-average concentrations, due to a change in prevailing weather patterns and localised changes in atmospheric chemistry (e.g. during future high insolation conditions). Increased temperatures could also increase sensitivity of receptor to air quality due to open windows/doors for ventilation.	Greater adverse impact if short-term or annual-average air pollutant concentration objectives and standards are exceeded.	Air pollutant emissions from road transport can be mitigated through a Travel Plan and enabling infrastructure to support the increasing use of electric or alternative fuel vehicles.	ES Chapter 7: Air Quality
	Noise	Greater sensitivity to noise during high temperature conditions due to open windows/doors for ventilation. Increased susceptibility to impacts under the stress-cardiovascular model of noise effects on health due to combination with high temperature cardiovascular stress.	Greater adverse impact from noise disturbance.	Attention to noise control in detailed design (building fabric).	ES Chapter 15: Noise

Climate change effect	Receptor group	Potential for climate change to modify the effect on receptor	Effect on receptor	Mitigation measures	Further information
Drought and increased summer temperatures ('heatwave')	Population & health	Increased susceptibility to impacts via environmental pathways, particularly for vulnerable groups, during heatwave conditions.	Greater adverse impact on public health outcomes, particularly respiratory & cardiovascular disease incidence and depression/anxiety prevalence.	As above for the environmental impact pathways.	ES Chapter 12: Human Health
	Ecology	Potential changes in the sensitivity of habitats or species to development impacts in the future due to the changes in seasonal weather and available habitat.	Greater adverse impact on species and habitats.	Consideration of diversity within habitat creation to provide resilience for species in the area.	ES Chapter 11: Ecology
	Water environment	Reduced resilience of potable water supply, and greater impact of demand on surface or groundwater abstraction.	Greater potential for impacts on waterbody status and habitat value.	Minimisation of potable water demand through water efficient fittings.	Climate Change Statement
Winter storm and extreme weather events	Traffic and transport	Extreme weather events could reduce resilience of the transport network to additional traffic generation.	Greater adverse impact on road users and on Proposed Development users.	The Proposed Development is not located in a remote location and there are several alternative routes to access the Site and surrounding area.	ES Chapter 17: Transport and Access
	Landscape and visual	Intense rainfall events during the winter and hotter drier summers may lead to an increased risk of erosion of soils, in turn impacting proposed landscape planting.	Greater adverse impact on visual receptors.	Consideration of planting (in particular ground-cover planting and grasses) to ensure no exposed bare soils to wind or water erosion.	ES Chapter 14: Landscape and Visual

10.5 Summary and conclusion

10.5.1 This appendix has considered the potential for the environmental pathways identified within applicable ES chapters to interact and combine with the effects of climate change during the construction phase and occupational lifetime of the Proposed Development.

10.5.2 Climate change is likely to impact receptors in two main ways: through drought and increased summer temperatures, and through winter storm and extreme weather events. There is the potential for several inter-related effects on receptors that could lead to greater adverse effects as a result.

10.5.3 Suitable mitigation measures are summarised in Table 10.1 for the design and operation of the Proposed Development to limit the potential for inter-related adverse effects on receptors as a result of the effects of climate change.